ADVANCED MANUFACTURING

Associate Degrees

The College Transfer Office (https://www.dccc.edu/admissions-financial-aid/transfer/transfer-office/) is set up to help Delaware County Community College students transfer to four-year colleges and universities. If you are planning to transfer, you are strongly encouraged to meet with a transfer advisor within your first two semesters (or before you reach 30 transferable college credits from all institutions attended).

Associate in Applied Science (AAS) Degrees

Advanced Technology (ADVT) (https://catalog.dccc.edu/academic-programs/programs-study/advanced-technology-aas/)

The Advanced Technology Program is designed to serve individuals who desire hands-on training and education for the acquisition or advancement of a technical career in areas such as manufacturing, electronics, industrial production, process control, computer aided design and drafting, facilities management and CNC operations.

The program is flexible enough that it can serve those both at entry level and those with established skills who seek technical growth or advancement through continued education. The program provides for up to 24 credits to be awarded toward the Associate of Applied Science Degree for technical courses or certificates completed at the college. The curriculum includes general education and information technology cores that will develop skills in communication, computer applications and applied science while strengthening problem solving and critical thinking skills essential to career advancement.

Machine Tool Technology (MTT) (https://catalog.dccc.edu/academic-programs/programs-study/machine-tool-technology-aas/)

The associate in applied science degree in Machine Tool Technology emphasizes the advanced manufacturing technologies. Students are prepared to work in precision tooling, machining and manufacturing. Graduates could qualify for positions as machine tool operators; machinists; Computerized Numerically Controlled (CNC) machinists and programmers; Electrical Discharge Machine (EDM) operator/programmers; computer-aided drafting/design and computer-aided machining/manufacturing (CAD-CAM) programmers, toolmakers, mold makers and inspectors.

Technical Studies (TSTU) (https://catalog.dccc.edu/academic-programs/programs-study/technical-studies-aas/)

The Technical Studies degree program is designed to provide recognition for work and life experience while assisting individuals in their preparation for career advancement or change. This program is designed to provide skills for personal, professional and community improvement. The program is highly individualized and flexible. As many as 20 credits may be awarded for work and life experience including military experience, trade/proprietary school preparation, apprenticeship programs, structured on-the-job training and the like. Graduates will be awarded the associate in applied science degree upon successful completion of this program. Technical Studies has been designed as a first-degree program and therefore cannot be pursued as a second degree at DCCC.

Certificates

Certificates are short-term educational programs focused on specific work force skills and/or preparation for continued academic study. Delaware County Community College offers a Certificate of Competency (https://catalog.dccc.edu/academic-information/degree-certificate-requirements/#CertComp) and a Certificate of Proficiency (https://catalog.dccc.edu/academic-information/degree-certificate-requirements/#CertProf).

Computer-Aided Drafting, Certificate of Competency (DDTC) (https://catalog.dccc.edu/academic-programs/programs-study/computer-aided-drafting-certificate-competency/)

In this program, students will learn to manage computer systems for drawing production, information storage, retrieval and communication in the engineering and design workplace. As they develop computer aided drafting skills, they will explore manufacturing, mechanical and architectural engineering and construction applications.

This program is intended, primarily, to serve as computer training for individuals who have previous experience as manual “board” drafters and who already possess a working knowledge of technical drawings. However, though there is no requirement of prior technical experience, individuals desiring an elementary introduction to the fields of engineering drafting and design will be well served by this curriculum.

Students may, through the use of specified course alternatives, choose to pursue a basic 2D option with added emphasis in elementary blueprint reading and construction applications, or a 3D parametric modeling option with emphasis on advanced software features and mechanical/manufacturing applications.

Computer-Aided Machining Lathe, Mill and EDM, Certificate (CAM) (https://catalog.dccc.edu/academic-programs/programs-study/computer-aided-machining-lathe-mill-edm-certificate/)

This advanced certificate is designed for students who have completed the CNC Programming-Lathe and Mill Certificate and also have prior machining experience. The Program prepares the student for entry-level positions in the occupational specialty of Computer Aided Manufacturing/Machining in Lathe, Mill and EDM programming and operations. Concepts covered in the program include CAM as a design, management and operational tool, principles of EDM technology and production utilizing EDM equipment. The students will learn how to maximize efficiencies and effectiveness via software and equipment integration. Departmental approval is required to enroll in the Program.

Construction Supervision (CSUP) (https://catalog.dccc.edu/academic-programs/programs-study/construction-supervision-certificate/)

The Construction Supervision program is designed for individuals with an established background in the construction trades who are seeking advancement to supervisory leadership positions. The core courses will develop an appreciation of the importance of good communication skills, human relations skills and the fundamental challenges of achieving organizational goals through the efforts of others. Emphasis is placed on understanding the legal, contractual and organizational practices

that form the basis of an effective construction organization. The Construction Supervision electives provide an additional component of focused activity relevant to the students particular trade background and professional goals. Typical job titles serviced by this curriculum include Construction Foreman, Construction Group Leader and Site Superintendent.

Electro-Mechanical Technologies, Certificate (ELTC) (https://catalog.dccc.edu/academic-programs/programs-study/electro-mechanical-technologies-certificate-competency/)

Electro-Mechanical Technologies program is designed to prepare students for employment as electro-mechanical technicians who assemble, install, troubleshoot and/or repair mechanical, electrical and fluid power systems. The program includes instruction in industrial robotics, electrical controls and programmable controllers, manufacturing and operational testing, as well as system analysis and maintenance procedures.

Industrial Production Technician, Certificate of Proficiency (IPT) (https://catalog.dccc.edu/academic-programs/programs-study/industrial-production-technician-certificate-proficiency/)

This program is designed to provide the student with skills and knowledge relevant for preparation and advancement within entry-level positions of employment as production workers, operators, helper trainees, or helpers in varied fields of employment in industry. The program is structured to also afford a currently employed student/worker (as well as employers) with a means for developing an opportunity to explore new job responsibilities, as well as to enhance current job skills and knowledge within a company. This effort will be designed to provide an opportunity for the individual to be better prepared to avail themselves of career advancement opportunities as they are encountered. The program provides for a formalized integration of collegiate level course work and at the same time, compliments this education with formalized College Sponsored Experienced Learning (CSEL) "on-the-job" (OJT) learning/training. Experiential learning will consist of a formally structured training plan, having been developed with a respective employer and, an appropriately identified college advisor, as well as the student.

Manufacturing CNC, Certificate of Proficiency (CNCP) (https://catalog.dccc.edu/academic-programs/programs-study/cnc-programming-lathe-mill-certificate-proficiency/)

This certificate is designed to prepare students for Computer Numerical Control (CNC) machining and is also ideal for students who need to upgrade prior machine shop training to comply with the current needs of industry. Students learn the techniques, hardware, software menus and computer system practices associated with a Computer-Aided Machining/Distributed Numerical Control (CAM/DNC) system to manually write, save, retrieve and transfer CNC machine tool programs. The curriculum is designed to prepare students to sit for NIMS certification upon completion of the program. NIMS (National Institute for Metalworking Skills) credentials signifies a person can perform the work of a CNC Machine Operator according to recognized national standards.

Process Control Technology, Certificate of Proficiency (PCT1) (https://catalog.dccc.edu/academic-programs/programs-study/process-control-technology-certificate-proficiency/)

This certificate is designed to provide students with the necessary skills and knowledge to seek employment as Process Operators/Technicians in automated manufacturing and production facilities. The program provides students with an introduction to the concepts, theory, principles, and technical demands, as well as the hazards, and accident prevention aspects associated with the operation of processing equipment.

Courses

View full A-Z Course List

ARC - Architecture

ARC 121 Architectural Graphics I

An introduction to the fundamentals of drafting for architectural construction, the course is primarily directed at developing construction documentation skills with a review of light frame construction materials and methods. The course begins with instruction in the application of basic hand sketching and computer-aided drafting skills and the fundamental principles of graphic delineation. It leads students through the development of a set of residential construction documents. Included is an overview of reprographic techniques for the use of related office equipment such as the Diazo whiteprinter and electrostatic copier.
Upon successful completion of this course, students should be able to:
Demonstrate familiarity with reprographic techniques for basic office equipment and processes used in construction documentation.
Select appropriate light frame, residential construction material and assemblies in response to a schematic architectural design.
Solve design development problems, given a preliminary design concept, involving issues of space function and layout, construction detail and aesthetics.
Prepare graphic documentation, using computer assisted drafting, to communicate a residential design concept to the contractor.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

ARC 215 Architectural Design Concepts

This course presents fundamentals of the architectural design process and the graphic techniques, both manual sketching and CADD, for creating and presenting design ideas including a review of the types of problems and concerns that characterize design decisions. The course emphasizes the need to conceive and manipulate architecture as space. Architectural programming is introduced along with conceptual diagramming techniques and development of preliminary plans. Design projects develop the ability to organize space in two- and three-dimensional contexts. Selected technical topics such as stairway design, complex roof intersections and egress requirements may be introduced.
Upon successful completion of this course, students should be able to:
Select and manipulate, manually and with CADD, various drawing types that are used in analyzing and creating design solutions.
Recognize and characterize spatial elements and concepts.
Develop and utilize a set of space definitions and an architectural program.
Analyze and document site opportunities and constraints.
Develop a preliminary design concept from an organizational diagram.
Complete a design development from a preliminary concept.
Calculate or apply standard design performance measures.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

ARC 221 Architectural Graphics II
An advanced-level course in the graphic documentation of construction concepts using manual sketching and CADD techniques. Emphasis is placed on the development of working drawings for commercial buildings and site construction. Principles of materials and methods of construction are integrated into a project where the student is required to derive and document solutions to site development, structural, building envelope and finish- material systems. NOTE: Prerequisites: Prior technical drawing experience and a basic knowledge of materials and methods of heavy construction.
Upon successful completion of this course, students should be able to:
Make preliminary selection and sizing of structural components from standard load tables.
Apply basic building code requirements to schematic design concepts.
Develop details for major architectural systems and components.
Analyze the overall design and details to accommodate the needs of working loads, weather, thermal shock, constructability, working tolerances and occupancy use.
Complete a set of construction documents for a modest commercial structure using CADD systems.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

ARC 226 Mechanical and Electrical Systems in Buildings
This course presents a quantitative and qualitative survey of lighting, power distribution and heating, ventilating and cooling systems in buildings. Emphasis is placed on considering the impact of design decisions on life cycle costs and operations issues.
Upon successful completion of this course, students should be able to:
Discuss the various configurations of equipment used in hot air, hot water and steam heating systems and their functions.
Show how domestic hot-water systems function utilizing alternative fuels.
Explain how electric power and lighting systems are distributed through a building.
Determine, from architectural drawings, the U factor of a building.
Calculate heating requirements for homes in various geographical locations.
Determine, from architectural drawings and specifications, the type of heating and/or air conditioning system specified.
Discuss the role of insulation and other envelope design elements in energy management.
Identify structural envelope leaks and specify means for correcting them.
Discuss "Passive" and "Active" solar energy collection system design theory and relate them to specific problems.
3 Credits 3 Weekly Lecture Hours

IST - Industrial Systems

IST 100 Introduction to Industrial Systems Technologies
This is a hands-on introductory course intended to acquaint students with basic skills and knowledge required as a part of the Industrial Systems Technology program. This course is specifically designed to provide knowledge and skills required for installing, maintaining, and replacing various process equipment and systems. Specific instruction in this class will cover moving and rotary equipment including terminology, function, components and purpose. Heavy emphasis will be placed on drives, belts, chains, gears, couplings, alignment, lubrication, packing and seals. Safety practices and procedures regarding the use of hand and power tools for equipment installation, repair and replacement will be stressed. The proper use of equipment and installation manuals and standards will be addressed. This course is recommended for students who have little or no industrial equipment experience.
Upon successful completion of this course, students should be able to:
Identify motion equipment such as conveyors, pumps, drives, gears, etc.
Select and install appropriate fasteners such as nuts, bolts, snap rings, pins, etc.
Describe the primary function of motion equipment as it relates to a manufacturing or an industrial processing system.
Describe and demonstrate various methods of shaft alignment.
Research and explain manufacturer's specifications, ie, installation, operation, maintenance, service and repair.
Define the criteria for measurement, usage, and application of various measuring instruments commonly found in industrial facilities.
Interpret and use Process and Instrumentation Diagrams (P&ID's) for various pieces of mechanical equipment, to include instrumentation, piping and other devices.
Describe equipment maintenance with regard to planning, scheduling, selection of parts, power and hand tool requirements with a strong emphasis on environmental, accident prevention, and health issues.
Select the proper tools, equipment and instruments to install/align a drive unit and coupling.
Compare and contrast belt, chain and gear drives.
Calculate various drive ratios for speed and torque.
Classify industrial drive systems and their applications.
Utilize manufacturer's specifications to determine replacement parts.
Analyze lubrication and packing seals to assure appropriate equipment performance.
Plan, schedule and employ practical preventive maintenance for various pieces of equipment as part of an industrial system.
3 Credits 3 Weekly Lecture Hours

IST 101 Industrial Drive Systems
This course is designed to present the theory and practical applications associated with industrial drive systems. Specific instruction will be placed on the demonstration of knowledge and skills required of an Industrial Systems Technician. Students will learn how to analyze, operate, install, troubleshoot and maintain various mechanical systems utilizing belts, chains and drive shafts, and associated components such as bearings, seals, gears, couplings, sprockets, keys and linkages. Heavy emphasis is placed on mechanical drive arrangements where practical solutions are required. Students will also become familiar with drive units and speed control systems.
Upon successful completion of this course, students should be able to:
Describe the terminology, design, function, and components of both belt and chain driven systems.
Explain the function of cogged belts, and synchronous belts and their benefits.
Compare the varied types of drive and speed control systems used in industry.
Define various types of chain lubrication methods, and demonstrate how to maintain each.
Compare various types and applications of gera drives and their applications.

Perform calculations involving ratios, shaft speed, and torque for a gear train drive system.
Describe the function of chain drive components within various types of chain drive systems, and specify a system for a given application.
Select the appropriate belts, pulleys, chains and sprockets for a specific system installation.
Describe the function, operation, safety features, lubrication, and maintenance requirements of a material handling conveyor system.
Calculate pulley ratios as well as shaft speed and torque associated with a belt drive system and determine belt deflection for a given application.
Calculate conveyor belt length and linear speed using multi-methods.
Conduct job planning and perform routines to include lockout and tag out procedures for varied pieces of industrial process control equipment.
Install and align a conventional v-belt drive system, a multi-belt drive system and describe the methods for measuring belt tension.
Remove and install a chain sprocket and set chain sag for a given application.
Demonstrate the installation and alignment of a single, and a multiple chain drive system.
List various coupling design categories, and demonstrate coupling alignment using rim, face indicator methods.
Specify, install, operate, troubleshoot and maintain a flat belt conveyor system.
Start-up and operate a manually controlled processing system, an open loop control system, and a closed loop control system.
Troubleshoot belt drive, chain, and coupling systems.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

IST 105 Industrial Systems Drawings
This introductory course in blueprint reading prepares students to interpret mechanical, electrical and commercial architectural drawings and plans. Students learn about the different types of graphic representations in the electrical, mechanical and commercial construction trades, as well as how these drawings are related to the job requirements of an Industrial Systems Technician. The course will cover mechanical drawings, orthographic projections, dimensioning, use of symbols, wiring and control diagrams, piping and electrical distribution systems, and commercial construction building site plans. Emphasis will be placed on the understanding, interpretation, and application of drawings.
Upon successful completion of this course, students should be able to:
Define the purpose and use of symbols as well as the terminology associated with industrial system drawings.
Relate the meaning of line types, dimensions, views and sections, orthographic projection, notes, etc.
Describe mechanical details, components, and assemblies.
Interpret electrical schematics, to include single line, full wiring, and electrical ladder diagrams.
Decipher building wiring, conductor color coding, phase color coding and termination schemes.
Read drawings of lighting, electrical, and piping distribution systems as well as AC control circuits.
Create and utilize HVAC, wiring, and plumbing schematic diagrams.
Apply schedules, site plans, and construction specifications as part of job planning requirements.
Analyze records, reports and other documentation.
Prepare reference documents as per in-the field installation, repair or replacement requirements.
Conduct material take-off and basic estimating routines utilizing drawings.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

IST 190 Industrial Systems Internship (1 credit)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 60 hour internship will earn 1 college credit for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Demonstrate specifically how job-related competence has improved.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
1 Credit

IST 194 Industrial Systems Internship (2 credits)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 120 hour internship will earn 2 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Demonstrate specifically how job-related competence has improved.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
2 Credits

IST 199 Industrial Systems Internship (3 credits)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 180 hour internship will earn 3 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Demonstrate specifically how job-related competence has improved.
3 Credits

IST 200 Pumping Systems
This course provides students with basic skills and knowledge associated with the theory of industrial pumping systems, to include various pumps and system terminology, classification, specification, identification, installation, operation, troubleshooting and maintenance. Theoretical and laboratory instruction in this course provides students with a complete introduction to pumping system function, selection, sizes, dynamics and applications. Topics of coverage will emphasize flow, pressure, metering, valves, piping, single and multi-stage pumps, as well as inlet and discharge designs. A heavy emphasis will be placed on installation, routine and preventative maintenance, and troubleshooting of systems.
Upon successful completion of this course, students should be able to:
Define and describe the function of a pump, and give an application.
List and define various categories and types of pumps and their applications.

Utilize appropriate terminology associated with pumps and pumping systems.
Explain the dynamics of a pumping system.
Interpret and explain manufacturer's pump specifications and pump curves.
Define pump efficiency and explain its significance to overall system operations.
Describe the function, purpose, and applications of series and parallel pumping systems.
Specify fluid properties relative to pump selection and operation.
Describe the installation of a single stage pump, to include sizing specifications and measurements.
Describe the purpose and proper use of a flow meter.
Calculate flow velocity and describe the relationship between pressure and head.
Explain cavitation in a pump system, as well as corrective actions.
Identify and configure pump motors and drives.
Determine and select measurement instruments, tools, anchors, shims, fittings, valves, piping, and gasket materials required to install a pumping system.
Calculate pump efficiency and make proper adjustments (as applicable).
Describe suction, discharge, and total head and demonstrate the use of pressure and vacuum gauges.
Install a centrifugal pump using manufacturer's specifications.
Identify, specify, and replace packing and mechanical seals.
Start-up, inspect, maintain and troubleshoot a pump.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

MTT - Machine Tool Technology

MTT 108 Mathematics for Occupational Technologies

This course is designed to provide the student with relevant theory and skills in solving practical, industrially based mathematical problems. Topics of instruction will include, but will not be limited to, calculating arithmetic expressions involving whole numbers, fractions, decimals, ratio, proportion, and percentages. The appropriate use of English/metric conversions, exponents, square roots, basic graph interpretation, and basic algebraic expression (formulas) manipulation will be presented. In addition, the solution of geometric figures will be addressed. An introduction to the use of trigonometry for the solution of right and oblique triangles will also be included.

Upon successful completion of this course, students should be able to:

Conduct arithmetic operations using whole numbers, fractions, and decimals for the solutions of typical technologically based concepts, processes and operations.

Perform English and Metric computations involving numeric and literal problems.

Demonstrate the use of a Cartesian and a polar coordinate system to interpret and construct basic graphs, such as; bar, pie, broken line, etc.

Analyze data and select an appropriate method to construct a chart, or graph, as well as decipher relationships among topical data.

Solve fundamental expressions and common formulas using algebraic rules for addition, subtraction, multiplication, division, ratio, proportion, percentages, powers and roots, and transposition of terms, to include mixed operators.

Apply appropriate terminology and rules for solving problems involving basic geometric entities and figures.

Communicate the rules of similarity and congruency and solve basic triangles.

Identify and construct right triangles and utilize the Pythagorean theorem, sine, cosine, and tangent functions and The Law of Sines/Cosines for the trigonometric solution of unknowns.

3 Credits 3 Weekly Lecture Hours
1 Weekly Lab Hour

MTT 110 Print Layout and Measurement for Machining

This introductory course is designed to provide instruction in the theory and skills necessary to read conventional drawings commonly used in the machining industry. Instruction will be centered around object visualization and feature definition/recognition. Basic through intermediate difficulty multiview third angle (with lesser emphasis on first angle) projection, to include orthographic, isometric, sectional and auxiliary view drawings will be addressed. Piece-part feature terminology, tolerances, limits, fits, conventional dimensioning practices, surface finish and inspection issues will be stressed. Sketching, precision layout tools, measurement tools, and techniques of usage will be covered and utilized to demonstrate comprehension in print/part interpretation.

Upon successful completion of this course, students should be able to:

Discuss the purpose, the importance, the types, and various uses of engineering drawings, as they relate to the design and manufacture of parts.

Communicate the purpose of a title sheet, and relate the value of each of its components to the process of completing a finished product.

Analyze the features of an object and develop representative sketch using the principles of orthographic projection.

Interpret line work, dimensions, orthographic views, various section types, auxiliary views, and annotations associated with mechanical drawings.

Visualize objects, describe geometric relationships, determine feature size and placement, and apply terminology in the interpretation of graphical representations of a tab, bevel, chamfer, neck, fillet, round, slot, keyway, flat, boss, pad, hole/pattern, countersink, counterbore, tapered surface, as well as English and metric thread forms.

Describe, discuss and apply the techniques used in standard coordinate dimensioning methods to complete sketches, to layout parts, and perform inspection operations.

Identify, and discuss the purpose, and the limitations, of various layout tools; and, of common precision measuring instruments.

Demonstrate the use of various layout and precision measurement tools.

4 Credits 3 Weekly Lecture Hours
1 Weekly Lab Hour

MTT 111 Introduction to Manufacturing
This course provides an introduction to the field of manufacturing/machining. The course is designed to provide instruction in the commonalties of theory and skills associated with various branches of the manufacturing industry. An overview of departments, engineering design, job planning, process documents, manufacturing support team responsibilities, as well as production workforce member's duties and responsibilities will be discussed. Shop floor etiquette, workplace cleanliness, safety and health, common powered and non-powered hand tools will be covered. Machine tool operations involving cut-off and contour metal cutting saws, drilling machines, offhand grinding of High-Speed Steel (HSS) twist drills and lathe tools as well as surface grinding operations will be addressed. The application of measuring and layout tools will be combined with piece-part layout and inspection practices for part production. Materials, including cutting tools, and their properties will be introduced. Non-traditional machining processes, special purpose production machines, as well as hard and soft automation are among additional topics to be discussed. A rudimental introduction/familiarization with conventional lathes and milling machines will also be included.
Upon successful completion of this course, students should be able to:
Describe the purpose, importance, and responsibilities of various personnel and departments within a manufacturing organization.
Determine the general salary ranges and job description for a position of employment.
Outline a plan for personal career path growth in manufacturing.
Interpret work-related documents such as work orders, process, and various operation sheets.
Apply appropriate terminology in order to, select, handle, care for, and store tools used to perform bench work, inspection and assembly operations.
Discuss and apply basic accident prevention practices and procedures, commonly required in manufacturing, as well as personal safety equipment; in order to assure personal health and safety.
Compare and contrast hardness and machinability ratings.
Demonstrate procedures for set-up and operation of various sawing, drilling, offhand, and surface grinding machines.
Perform commonly assigned operator clean up and maintenance tasks associated with grinding, sawing and drilling machines.
Demonstrate appropriate shop floor etiquette among co-workers and discuss the basic concepts of customer relationships in the context of work teams facilitation.
Describe various characteristics associated with special purpose machines, mass production, hard and soft automation and assembly techniques.
Define various common acronyms associated with processes, equipment, and operations common to the manufacturing industry.
Describe the geometric features and part shapes created by broaching, shaping, planing, lathe and milling machine operations.
Explain the various abrasive machining processes; and, the high production thread and gear cutting processes.
Discuss the nature, properties, and selection criteria for various types of materials used to manufacture parts.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

MTT 112 Lathe Operations I
This course provides instruction in the terminology, design, setup, operation, and daily care of conventional metal working engine and related lathes. Theory and practical skill development exercises will focus on cutting tool preparations for completing external surface machining such as; straight turning, threading, chucking and tailstock operations. Accident prevention practices and procedures will be stressed throughout the course.
Upon successful completion of this course, students should be able to:
Lubricate, clean, and perform commonly assigned operator maintenance duties for a lathe.
Interpret work-related documents for piece-part machining on a lathe.
Utilize appropriate terminology and accident prevention practices and procedures while referring to, and using lathes, and related accessories.
Research design criteria and sharpen lathe tools and twist drills via off-hand grinding.
Utilize detail drawings, calculations, layout tools, precision measuring instruments and appropriate techniques to prepare parts for manufacture on a lathe and verify part dimensions during inspection procedures.
Identify, select, mount, set-up and adjust appropriate machine tool accessories, attachments, work holding and tool holding devices, cutting tools, and work-pieces in preparation for performing lathe operations.
Calculate and set speeds/feeds in order to perform lathe operations such as facing, chamfering, center drilling, drilling, reaming, turning, necking, grooving, parting, knurling, external threading as well as hand tapping, filing, polishing, and de-burring.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

MTT 122 Lathe Operations II
This course is designed to provide supplemental theory and skills instruction in conventional lathe machining operations. Skill embellishment and expanded external, as well as internal surface piece-part machining operations and associated accident prevention practices and procedures will be stressed in this course. Concepts and mathematical calculations for part geometry determination, specific lathe (machining) requirements, and the use of digital readout units will be covered. Carbide/ceramic/diamond cutting tool material, insert, and tool holder identification and selection requirements for lathe work will be explained in detail. Process planning and Geometric Dimensioning and Tolerancing (GD&T) characteristics appropriate for lathe machining will also be addressed.
Upon successful completion of this course, students should be able to:
Set-up and operate a conventional engine lathe to complete intermediate to advanced operations involving trepanning, tool post grinding, radius-turning devices, threading (tap/die) heads, steady, and follower rests.
Select accessories and attachments, set-up and use face plates, independent, universal, and combination chucks, collect attachments, and a steady rest to facilitate internal surface feature creation such as radii, bores (straight, and tapered), grooves, and chased threads on a lathe.
Interpret print requirements (including GD&T) and part geometry for machining and inspection of advanced lathe parts.
Identify coolant requirements; and, using machinability and other factors, select inserts and toolholders for job completion.
Perform geometric/algebraic/trigonometric calculations for set-up, machining and inspection of parts, to include chamfers, tapers, threads, etc.
Review reference materials in order to develop a process plan (to include job/operations tooling, and inspection procedures) for machining of a basic lathe piece-part.
Conduct mathematical calculations associated with tapers, threads, torque, horsepower, unit cycle time/cycle time reduction, and basic estimating.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

MTT 124 Milling Operations I
This course provides introductory instruction in the terminology, design, application, set-up, operation and daily care of conventional milling machines. Accident prevention practices will be stressed.
Upon successful completion of this course, students should be able to:
Lubricate, clean and perform commonly assigned cleanup and operator maintenance duties for a milling machine.
Interpret work-related documents for piece-part machining on a milling machine.
Utilize appropriate terminology when referring to milling machines, attachments and associated equipment.
Utilize detail drawings, calculations, layout tools, precision-measuring instruments and appropriate techniques to prepare parts, and to verify part dimensions during inspection procedures.
Identify required work and tool holding devices, select, mount, set-up and adjust appropriate accessories, attachments, and workpieces in preparation for performing milling machine operations such as facing, step, and slot milling, chamfering, spot drilling, drilling, reaming, spot finishing as well as hand tapping.
Perform machine head/table and workholding device alignments.
Calculate and set speeds and feeds, and perform milling machine operations.

3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

MTT 129 Solids (CAM) Modeling
This course is designed to provide introductory instruction in the theory and skills associated with Computer Aided Manufacturing (CAM) solids modeling industry. 3D design / modeling characteristics as well as criteria for constraint and feature-based design modeling will be stressed. Specific elements of designing for Computer Aided Machining (CAM) facilitation will be addressed.
Upon successful completion of this course, students should be able to:
Determine occupational positions and define basic terms relevant to functioning within the engineering design/manufacturing CAM industries.
Analyze piece-parts for parametric feature/profile/surface and pattern definition.
Describe work and tool planes, axes, coordinate systems, and develops feature definitions for manufactured parts.
Interact with hardware/software in order to create and manipulate various views as a means for appropriately displaying a model.
Plan and demonstrate steps for creating and modifying (manufactured) part models using a CAM package.
Develop intermediate to advanced geometric part features and surface models using extrude, revolve, swept, and lofted function solid modeling techniques.
Manipulate part definition history, and edit shapes via cut and paste functions, as well as Object Linking and Embedding (OLE) functions of the solid modeling software.
Create/customize and present working (or shopfloor) documents.
Analyze factors, design and create/customize, and communicate information regarding templates for manufactured part production.
Perform extraction, as well as import and export operations involving graphical data.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

MTT 190 Machine Tool Internship (1 credit)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 60 hour internship will earn 1 college credit for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Demonstrate specifically how job-related competence has improved.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
1 Credit

MTT 194 Machine Tool Internship (2 credits)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 120 hour internship will earn 2 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Demonstrate specifically how job-related competence has improved.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
2 Credits

MTT 199 Machine Tool Internship (3 credits)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 180 hour internship will earn 3 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Demonstrate specifically how job-related competence has improved.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
3 Credits

MTT 210 CNC Machine Tool Operations
This course is designed to provide appropriately prepared conventional machine tool operators with an introduction to Computerized Numerical Control (CNC) machine tool set-up and operation. Theory will be practical in nature and relate directly to shop based applications. Lathe, and mill, operations will be stressed; however, the theory and concepts will be applicable to various CNC machine tools.
Upon successful completion of this course, students should be able to:
Conduct commonly assigned CNC machine tool operator cleanup and maintenance activities.
Describe the various axes and coordinate systems associated with differing CNC machine tool types.
Apply accident prevention practices and procedures while interacting with the Machine Control Unit (MCU), as well as during program proof-out; and, while performing maintenance.
Discuss the types and principles of MCU offset registers, and their usage.
Analyze rudimental program problems and perform basic editing operations to modify G-code programs via Manual Data Input (MDI) operations.
Edit canned cycle functions utilizing calculations/data prepared by others to create simple G-code programs via conversational graphics as well as by typing on a personal computer.
Demonstrate upload/downloading and other Distributed Networked Computer (DNC) functions on a shop floor computer network.
Set-up, align, and zero-out workholding devices, tooling adapters, and toolholders.
Perform dry/first/production runs and inspections, adjusting various register values to assure tool qualification, and part dimensionality.
Communicate and apply piece-part set-up and inspection procedures commonly associated with, advanced Lathe and Milling Operations.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

MTT 213 Manufacturing Processes
This course is designed to provide broad spectrum, first exposure, technical instruction in the fundamental processes (other than material removal) used to produce manufactured goods. Various aspects of manufactures' responsibilities in providing producer and consumer goods, as well as services, will be covered. Generalized methods of conversion of materials into various forms and shapes via processes such as casting, extrusion, injection molding, welding, etc., will be the primary focus of this course. Principles, terminology, as well as practical applications will be stressed. In addition to rounding-out educational experiences for manufacturing/mechanical/drafting and design students, this course is also suited for providing novice engineers, supervisors, and managers with practical experiences in varied manufacturing processes.
Upon successful completion of this course, students should be able to:
Describe the design process and various considerations engineers typically ponder/explore before deciding on a process for manufacturing an article.
Discuss the production of parts with respect to the fundamentals of the casting and molding processes.
Demonstrate a basic understanding of the principles involved in the forming, rolling, drawing, extrusion and molding processes.
Differentiate, document, and demonstrate flame/arc cutting and welding process variables.
Compare and contrast various bonding, joining (to include welding and related processes), and mechanical fastening methods.
Research, and describe in an oral presentation, a non-traditional material removal process, or prototyping process available to manufacturers, relating same to aspects of future human development.
Distinguish between the common surface treatments and finishing processes.
Relate the classifications of production systems and the impact automation has for each.
Elaborate on the principles of Lean Production and the "Factory within a Department" concepts, suggesting their possible impact on the social fabric of the workplace.
Summarize the concepts and criteria for reducing costs and increasing productivity on the shop floor.
Utilize welding, melting, casting, and molding equipment to conduct laboratory exercises.
Present examples of how artists can use manufacturing processes to create works of art.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

MTT 214 Milling Operations II
This course is designed to provide theory and skill instruction supplemental to that introduced in Milling Operations I (MTT 124). Skill embellishment and expanded surface feature creation in the use of conventional metal working milling machines and attachments, along with associated accident prevention practices and procedures will be stressed. Concepts and mathematical calculations for machining of prismatic (cube-like) features and part geometry will be emphasized. Process planning, documentation and Geometric Dimensioning, and Tolerancing (GD&T) characteristics for milling work will be addressed. Cutters and insert (geometry and grade) selection, as well as cutting parameters, will be stressed.
Upon successful completion of this course, students should be able to:
Utilize detail drawings, layout, and inspection tools to produce parts via horizontal and vertical milling operations.
Plan sequential operations and develop a process, a tooling, and an operation sheet, for advanced piece-part manufacturing on milling machines.
Develop set-up and inspection procedures for milled parts.
Compare milling machine cutting tool material types, and their selection criteria.
Research machinability factors and ratings for various types and classifications of materials.
Refer to manufacturer's catalogs and apply theory of cutting tools to determine the application, and the identification of cutting tool adapters, cutters, and inserts.
Determine coolant selection, speed, and feed settings in regard to tool material and insert geometry requirements in order to obtain specific surface finish requirements on milled parts.
Interpret print requirements (including GD&T) and part geometry for machining and inspection of advanced milling parts.
Create internal features to include chamfers, bores, recesses, counterbores, countersinks, grooves and pockets using a milling machine.
Set-up and use various style cutters to create form (profile) geometry such as angle, convex, concave, radius, T-slot, and key-way features.
Mount and use milling machine accessories and attachments such as a right angle plate, rotary table, dividing head, boring head, angular vise, angle plate, V-blocks, sine bar/plate/vise.
Position fixtures and perform fly cutting, slitting, straddle, and gang milling operations.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

MTT 219 CAM Solids I

As a continuation of the principles of Computer Aided Manufacturing (CAM) design database development and usage, this course is designed to build on the course entitled Solids (CAM) Modeling (MTT 129). As such, instruction in this course will be centered around the theory and skills associated with the generation of 2 through 2 1/2 axis Computerized Numerically Controlled (CNC) machine tool code generation. Specific tool assignment and tool path generation for CNC milling and profiling [router, water-jet, laser and like machines] as well as conventional, two axis, CNC lathes will be addressed.

Upon successful completion of this course, students should be able to:

Conduct import and export, as well as other data file management and Distributed Networked Computer (DNC) operations.

Analyze geometry in order to develop tool path routines utilizing appropriate lead in/out and roughing moves to create desired features and surface quality.

Design and create libraries of commonly used machining operations, as well as modify operations to optimize tool paths for the improvement of part production efficiency.

Prepare piece-part modeling documentation, to include dimensioning; and, hard copy output.

Create tool paths for drilling, boring, and reaming on CNC mills and 2-axis lathes.

Develop, verify, and edit tool path, and CNC code, for single surface profile creation; as well as pocketing, island, and thin-wall surface and feature creation.

Generate roughing and finishing tool path for drilling, turning, grooving, facing, and threading (to include multiple lead) operations (inside and outside) on cylindrical parts.

3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

MTT 220 CNC Programming

This course is designed to provide the experienced Computerized Numerically Controlled (CNC) machine tool operator with instruction in manual part programming and advanced operations. Mathematical applications for definition of location, set-up, positioning and tool movement (absolute/incremental) within specific coordinate systems will be presented. Various aspects of intermediate to Advanced G and M code programming to include fixture offsets, thread milling, looping, macro, and sub program development/utilization/execution will be included. Criteria relevant to accident prevention practices and procedures, process planning, work-holding, tooling, machine set-up and operation, program proof-out, and quality control will also be addressed.

Upon successful completion of this course, students should be able to:

Via manual methods, interpret and convert basic piece-part drawings in order to produce proceduralized manufacturing process/operation, workholding, tooling documentation sheets, and job plans for a CNC mill (router on similar machine tool) and a CNC lathe.

Apply principles of mathematics, engineering print interpretation and geometric analysis to describe part datum's, surfaces, and feature locations in terms of 2 and 2 1/2, axis machine/tool positioning.

Prepare and proof a written manuscript for the production of parts on a CNC mill, (or similar machine), and a CNC lathe.

Utilize mathematical calculations, and concepts of geometric relationships combined with techniques, hardware, software menus and computer system practices associated with a Computer Aided Machining/Distributed Numerical Control (CAM/DNC) system to manually write, save, retrieve and transfer CNC machine tool programs.

Apply programming techniques (to include advanced canned cycle, loops, and macros).

Develop programs involving advanced operations such as helical interpolation and thread milling operations.

Program multiple and varied parts involving multiple operations per set-up to include the use of indexing devices.

Describe the purpose and use of charting as it applies to Statistical Process Quality Control (SPQC) in the CNC machining environment.

Discuss the principles and applications of parametric programming as they apply group technology part programming.

3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

MTT 229 CAM Solids II
This course in advanced principles of Computer Aided Manufacturing/ Machining builds on the skills and knowledge gained in CAM Solids I. Topics of instruction will include advanced (multisurface) part modeling and tool path generation for 3-axis milling (similar profiling) machines with additional positioning axis: and multi axis (mill-turn) lathes.
Upon successful completion of this course, students should be able to:
Analyze 3D-parts geometry in order to conceptualize and create tool paths for prismatic (cube-like) part contours and blended multi-surface generation via 3-axis milling.
Select an appropriate Computerized Numerically Controlled (CNC) machine tool for required piece-part production.
Structure a plan for approaching multi-part, same set-up, tool path generation for difficult to machine piece-parts.
Formulate a strategy, and generate axis positioning, as well as tool path code for 4th and 5th axis programming.
Generate tool paths for creating cross drilling, face contouring, and c-axis contours on mill-turn machine tool.
Customize a generic CNC machine tool post processor to produce desired machine/tool/program operation.
Robots software programming capabilities to consumer products and life style improvements.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

MTT 230 Electrical Discharge Machining
This course is designed to provide the student with the information and basic skills required to program and operate both ram (sinker), and 4-axis wire (EDM) Electrical Discharge Machining/machines. Instruction will address the fundamental principles of the EDM process, terms, capabilities, and machine tool system components. Aspects of programming and machining methodology, to include; work holding, tooling, electrode selection and operational characteristics, process variables, set-up and operation of ram and wire machines will be addressed.
Upon successful completion of this course, students should be able to:
Cite in writing, the principles of operation for the EDM process.
Identify the function and the components, and operational characteristics, as well as the operation parameters, of typical ram and wire EDM machine tools.
Compare and contrast requirements for ram and wire EDM machine maintenance, set-up and operation.
Summarize the various types of electrode materials and designs, as well as their application.
Explain the design and operational characteristics a ram type electrode must exhibit in order to perform appropriately.
Interpret work order requirements and set-up a typical ram, and a wire EDM machine tool for production.
Set-up and operate a ram and a wire EDM machine tool in order to achieve desired inspection/quality characteristics on a finished part.
Analyze part geometry requirements and create Computer Numerically Controlled (CNC) piece-part programs, incorporating control of various processes and machining parameters for machining on a ram; and, a 4-axis wire EDM machine.
Utilize CAM software programming options to modify cutting parameters and settings, part geometry at various points on a contour.
Conduct service and maintenance functions typically assigned to an EDM machine tool operator.
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

TCC - Technology Department Core

TCC 111 Technical Communications
This course presents instruction in microcomputer operations using integrated software packages. The principles of communication are stressed to provide students with the appropriate skills and knowledge to effectively manipulate and present information of a technical nature.
Upon successful completion of this course, students should be able to:
Demonstrate knowledge of and ability to use the current version of MS Office.
Effectively articulate technical procedures and other technical information.
Create, manage, store, and retrieve various forms of technical information using variety storage sources such as cloud based and web based systems.
Demonstrate strategies and methods for structuring an effective oral technical presentation.
Prepare written technical memos, reports and other professional documents.
College Academic Learning Goal Designation: Information Technology (TC)
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

TCC 112 CADD Graphics
This course provides students with the concepts and skills necessary to form the basis of object visualization and documentation inherent to the creation and conveying of technical designs and drawings. Appropriate drafting concepts and skills are developed through use of both free-hand sketching and computer-assisted drafting. Instruction in the use of CADD systems is integrated with graphic theory throughout the course. The course covers theoretical and applied drafting concepts appropriate for conveying graphical representation of objects and designs in a variety of technical environments including manufacturing and construction, as well as architectural, mechanical and civil engineering design.
Upon successful completion of this course, students should be able to:
Demonstrate the principles governing the setup and layout of technical drawings.
Discuss the geometric terms and principles used to define, design and represent drawing objects and entities.
Apply geometric construction techniques and principles of orthographic and pictorial projection for the representation of basic objects.
Perform basic annotation operations.
Apply acceptable forms of linework and text in both freehand sketching and CADD.
Demonstrate the use of basic office equipment, including computer information systems, for creating, managing, plotting and reproducing technical drawings.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

TCC 121 Project Management Processes
This course introduces students to the basic principles of project management. It is designed to provide students with foundations in initiating, planning, executing, monitoring, and controlling various projects. Students learn the fundamentals of project management knowledge areas such as, scope, time, cost, quality, human resources, communications, risk, procurement, and stakeholder management. Project Management can be applied to fields of construction, skilled trades, manufacturing, engineering, architecture, and others.
Upon successful completion of this course, students should be able to:
Develop a process based rationale for approaching project management.
Demonstrate ability to define project objectives and goals.
Demonstrate knowledge of the principles of scope management, risk management, cost planning and control, resource capacity analysis and allocation, time management and project scheduling, as well as change management.
Demonstrate the ability to create a Project Charter and Preliminary Planning Steps in the Initiation phase, as indicated in the Project Management Book of Knowledge or PMBOX published by the Project Management Institute (PMI).
Prepare a Project Task List that indicates task name, beginning and end dates of a task, and the length of time it will be required to completed the task.
Utilize Microsoft Project software to compile data, perform analyses, and generate project documentation.
Simulate project meetings with meeting minutes on individual student projects.
Verify the operation of current version of MS Project and insure the ability to integrate with other Microsoft and Industry acceptable standard.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

TCC 122 2-D CADD
This is a course in computer-aided design and drafting using two-dimensional orthographic projection drawing techniques. Emphasis is placed on sketching/layout techniques for personal-computer-based CADD system operations. A series of increasingly difficult drafting assignments, ending with presentation-quality CADD drawings will be the major outcome of the course.
Upon successful completion of this course, students should be able to:
Use appropriate sketching techniques to lay out a drawing, establish drawing parameters, determine set-up criteria and represent the conceptual aspects of views for a two-dimensional drawing.
Use various input devices, display, drawing and plotter commands to satisfy the specific requirements for completing drawings for both the mechanical and construction industries.
Modify and correct redlined orthographic drawings, using Inquiry and Edit commands available in the CADD software.
Provide annotation, in the form of standardized dimensions, notes, bill of materials, tabulation tables and other text on drawings.
Develop, structure and manage related drawing files and previously prepared drawings to associate desired information and entities for the creation of a specific set of final drawings.
Apply basic through intermediate techniques of drawing composition and development for plotting scaled views in various viewport configurations.
Create two-dimensional engineering charts, graphs and tables.
Develop User Coordinate Systems to facilitate drafting of intermediate through advanced drawing views to include orthographic, axonometric and auxiliary planar views.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

TCC 228 Design Project Methods
A capstone course applying the principles of design to the completion of a comprehensive individualized (or group) project in a student's selected field. Emphasis is placed on the decision-making roles and interactions of varied members of the professional design team.
Upon successful completion of this course, students should be able to:
Identify design-problem parameters by analyzing needs and setting objectives based on conditions of use and performance requirements.
Discuss the selection of materials for the design solution on the basis of properties, cost and manufacturing or construction processes.
Produce a preliminary design, sufficient to answer questions of economic feasibility, functional feasibility, and acceptability of character and appearance.
Plan and apply a service test to the preliminary design, making certain that the solution will meet end-use requirements.
Discuss specification development for documenting a design solution.
Create a comprehensive checklist of design procedures or methods.
Document the design, including detail and assembly drawings, supporting documents and schedules.
Use computer systems to create a design presentation package.
3 Credits 1 Weekly Lecture Hour
4 Weekly Lab Hours

TCS - Construction Technology

TCS 100 Construction Blueprint Reading

This course presents fundamentals in the understanding and use of basic construction drawings to determine methods and materials of light construction. a.) Architectural/Site: Emphasis is placed on residential and light commercial architectural drawings, architectural symbols, drafting practices, use of scales, applied geometry and orthographic projection. b) Heating, Ventilation and Air Conditioning (HVAC): Emphasis is placed on drawings and schematics for various HVAC systems, HVAC symbols, load calculation introduction. c.) Electrical: Instruction on interpreting electrical power plans, lighting plans, panel schedules and single-line diagrams as well as common ANSI (American National Standards Institute) and IEC (International Electro-technical Commission) symbols. d.) Plumbing: Instruction on interpreting plumbing plans and riser drawings including isometric details and common plumbing symbols.

Upon successful completion of this course, students should be able to:
Demonstrate competencies in reading and interpreting architectural construction drawings (floor plans, elevations, details, symbols).
Discuss architectural, carpentry, mechanical, electrical and plumbing materials and construction practices.
Demonstrate competencies in reading and interpreting HVAC technical drawings (floor plans, details, symbols).
Demonstrate competencies in reading and interpreting plumbing technical drawings (floor plans, isometric details, symbols).
Demonstrate competencies in reading and interpreting electrical technical drawings (floor plans, line diagrams, symbols).
Prepare for advanced studies in the architectural and MEP (mechanical, electrical and plumbing) construction fields.
Review and discuss the purpose of specifications for all trades.
Create floor plans and orthographic drawings based on blueprints and isometric drawingsUse architectural and engineering scales as well as calculations in conjunction with blueprints to determine the MEP information necessary for construction.
Develop working drawings in each of the programs (Architectural, Carpentry, HVAC, Plumbing, Electrical, Construction Supervision, and CADD) Understand the various types of architectural and MEP reference sources and use them effectively.

3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

TCS 105 Workplace Safety

This course is designed to provide students' with a general awareness on recognition, avoidance, abatement and prevention of safety and health hazards on a construction site. Topics covered in the class include fall protection, personal protective equipment, scaffolding, ladder safety, as well as safe and proper handling of tools and other construction equipment.

Upon successful completion of this course, students should be able to:
Demonstrate knowledge of worker rights that are protected under OSHA.
Demonstrate knowledge of the responsibilities an employer has under OSHA.

Demonstrate an understanding of general safety and health provisions.
Identify major fall, electrocution and other types of work hazards.
Demonstrate the use of personal protection equipment.
Identify major health hazards common to the construction industry.
Demonstrate workplace safety practices.

2 Credits 1 Weekly Lecture Hour
2 Weekly Lab Hours

TCS 108 Construction Supervision

Includes the basics of a supervisor's duties while on a construction project. The supervisor must define objectives that meet with the overall strategy of the organization and achieve results through the efforts of others; constantly evaluate and control production performance and motivate subordinates; a "Jack-of-all-trades" under the most adverse circumstances. All too often many skilled craftsmen are thrust into managerial positions without proper training and background and begin to learn by making mistakes in communicating, planning the job, human relations and the effective use of their own valuable, limited time. This course deals, in depth, with the what, why, how, when and where of construction supervision.

Upon successful completion of this course, students should be able to:
Assume the responsibilities and authority of the supervisor's position.
Apply the various techniques employed in motivating subordinates.
Use communication in leadership and utilize these necessary skills effectively.
Use scientific techniques in problem solving and apply these to assigned case studies.
Know what is expected of him/her relative to such items as contract documents; estimate preparation; state, federal and local forms; architectural specifications; building codes, etc.
Apply construction supervisor's responsibilities relative to setting up and controlling a job site.

3 Credits 3 Weekly Lecture Hours

TCS 109 Construction Project Administration

This course provides an introduction to the principles and techniques of construction project administration (CPA). In addition to the tactical decision making involved in site supervision, field personnel are required to contribute to the overall management system for planning and implementing the construction phases of a building project. The CPA system provides the overall contractor organization with an informed decision-making process, which guides the site supervisor in selecting the best means to expedite a job and provides the necessary data flow for accounting functions like billing and payroll. The CPA system also generates project records necessary for organizational processes such as liability management, costing and bidding, and organizational improvement. This course will prepare the student to participate in the CPA processes for project phasing and scheduling, cost estimating and control, and contract management.

Upon successful completion of this course, students should be able to:
Describe the critical elements of pre-construction operations.
Explain critical inputs to the process for construction planning and scheduling.
Monitor work progress.
Diagram the elementary work activities given for the job.
Track time duration information for activity completion.
Outline a logical order in which given work items must be done.
Discuss the elements of a sound job philosophy and the means for implementation.
Compare variations in type and elements of basic construction contracts.
Describe standard procedures for quality control in materials and workmanship.
Describe standard procedures for handling changes, claims and disputes.
Administer standard documents and procedures for construction project closeout.
Explain the documents required to recommend/allocate the final phase of payment and waiver of liens.

3 Credits 3 Weekly Lecture Hours

TCS 111 Methods/Materials of Construction I
This is the first course of a two-part introduction to the materials, assemblies and methodologies of general construction organized around Construction Specifications Institute division format. Topics begin with sitework and excavation techniques and proceed through basic building systems in concrete, masonry, wood, plastic and metal. Emphasis is placed on exploring the impact of design decisions and construction scenario on the final product. Case studies and project simulations are an integral part of the course.
Upon successful completion of this course, students should be able to:
Relate standard construction documentation to the materials and methods of general construction.
Identify and discuss building components from the perspective of material source and manufacture.
Identify and discuss building systems from the perspective of component assemblies and construction methodology.
Perform critical analysis and problem solving relative to construction project case studies and simulation scenarios.
3 Credits 3 Weekly Lecture Hours

TCS 112 Methods/Materials of Construction II
This is the second course of the two-part introduction to the materials, assemblies and methodologies of general construction organized around Construction Specifications Institute division format. Topics begin with building envelope systems and proceed through finishes, building equipment and basic systems. Emphasis is placed on exploring the impact of design decisions and construction scenario on the final product. Case studies and project simulations are an integral part of the course.
Upon successful completion of this course, students should be able to:
Relate standard construction documentation to the materials and methods of general construction.
Identify and discuss building components from the perspective of material source and manufacture.
Identify and discuss building systems from the perspective of component assemblies and construction methodology.
Perform critical analysis and problem solving relative to construction project case studies and simulation scenarios.
3 Credits 3 Weekly Lecture Hours

TCS 131 Estimating I
A method of standard construction estimating procedure from take-off to bid. The course includes excavation, concrete, steel, masonry, carpentry, alteration work, mechanical work, electrical work, and general conditions.
Upon successful completion of this course, students should be able to:
Demonstrate fundamental estimating skills.
Interpret construction plans and specifications.
Develop an estimate to include summaries and costs by category.
3 Credits 3 Weekly Lecture Hours

TCS 132 Estimating II
A continuation of Estimating I. This occurs is a laboratory presentation utilizing all acquired knowledge to compile essential data for an actual estimate.
Upon successful completion of this course, students should be able to:
Complete an actual estimate from drawings and specifications within the time limits allowed by the bid documents.
Obtain experience with the functions performed in a builder's office.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

TCS 141 Construction First Aid/Safety
Emergency first-aid and accident-prevention instruction for construction employees and managers. OSHA requirements are stressed in this course. Administrative aspects of recordkeeping requirements, rights and responsibilities, standards, safety program development and implementation are covered. Safety training includes identification and elimination of accident and health hazards, inspection techniques and administration of first-aid and CPR.
Upon successful completion of this course, students should be able to:
Describe the reasoning for accident prevention program development.
Identify the appropriate administrative requirements, as defined by OSHA, to effect an adequate accident prevention program.
Develop and implement an accident prevention program.
Administer first-aid/CPR or seek appropriate medical attention during a construction-related emergency.
3 Credits 3 Weekly Lecture Hours

TCS 190 Construction Management Internship (1 credit)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 60 hour internship will earn 1 college credit for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
1 Credit

TCS 194 Construction Management Internship (2 credits)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 120 hour internship will earn 2 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
2 Credits

TCS 199 Construction Management Internship (3 credits)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 180 hour internship will earn 3 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
3 Credits

TCS 221 Construction Survey and Layout
An introduction to the fundamentals of engineering construction and land surveys. Topics include surveying references, accuracy and errors, measurement of horizontal and vertical distances, and the measurement of angles.
Upon successful completion of this course, students should be able to:
Determine the horizontal location of a point and the direction to a second point utilizing coordinate geometry, azimuths, bearings and offsets.
Determine the degree of accuracy of a survey and distinguish between types of errors.
Calculate horizontal distances through the application of correction factors for temperature, tension, slope and tape calibration to field measured distances.
Determine the vertical location of a series of points with respect to a given datum.
Determine the difference in elevation between two points.
Measure accurate horizontal and vertical angles between two points.
Establish a line at a given angle of intersection with a known line.
Determine the magnetic bearing of a line.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

TDD - Drafting/Design Technology

TDD 128 Detailing-Assembly-Fixture Design

Concentrating on the appropriate documentation of the engineering design intent, this course introduces the technician to the concepts, skills and tools for developing formal, precisely constructed detail, assembly, fixture and tooling drawings. Knowledge and application of graphical principles for the creation of mechanical drawings is demonstrated through freehand sketching as well as the use of a computer-aided drafting/design system. The importance of standards, documentation and the appropriate use of technical graphics to compliment the communication process will be stressed. NOTE: Corequisites: TCC 122 or permission of instructor.

Upon successful completion of this course, students should be able to:
Perform mathematical calculations associated with cost estimation, justification, design, build/purchase of parts, fixtures and tooling.
Contrast various aspects of special, multipurpose and modular fixture/ tooling system design.
Discuss factors related to the determination of material usage, methods of construction and manufacture of work holding devices, fixtures and tools.
Utilize software library reference materials and data management techniques to assist in the design/drafting of parts, assemblies, fixtures and tools.
Detail working drawings via standard practices associated with geometric dimensioning and tolerancing.
Develop assembly drawings with associated bill of materials.

3 Credits 2 Weekly Lecture Hours
3 Weekly Lab Hours

TDD 190 CADD Internship (1 credit)

College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 60 hour internship will earn 1 college credit for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.

Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Demonstrate specifically how job-related competence has improved.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.

1 Credit

TDD 194 CADD Internship (2 credits)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 120 hour internship will earn 2 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Demonstrate specifically how job-related competence has improved.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
2 Credits

TDD 199 CADD Internship (3 credits)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 180 hour internship will earn 3 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
3 Credits 3 Weekly Lecture Hours

TDD 203 Kinematics
This course provides an introduction to mechanisms used for transmitting forces, controlling position, determining spatial interference and providing feedback information.
Upon successful completion of this course, students should be able to:
Set up and solve basic problems in spatial motion analysis, using both graphical and analytical methods.
Design simple mechanisms.
Draw simple mechanisms.
Set up and solve kinematic problems involving straight-line motion, rotary motion, and combined motion.
Solve problems involving cams, gears and gear trains.
3 Credits 2 Weekly Lecture Hours
3 Weekly Lab Hours

TDD 216 Three Dimensional CADD
This course provides instruction in advanced computer-aided design and drafting (CADD) techniques in addition to creation of three-dimensional drawings. Students progress from two-dimensional projection to wireframe, surface modeling, solids modeling and rendering techniques. Emphasis will be placed on maximizing a personal computer-based CADD system to develop a series of increasingly difficult drafting assignments and ending with a presentation quality final project and portfolio of completed drawings.
Upon successful completion of this course, students should be able to:
Describe user coordinate systems, workplanes and coordinate data, using absolute, relative, polar and spherical coordinates, as well as coordinate filters, to create planar, prismatic and three-dimensional curved features on drawings.
Create semi and logarithmic scales and charts, as well as three-dimensional pictorial line and pie charts, bar graphs, scatter plots and surface plots.
Construct three-dimensional drawings consisting of wireframe, primitives and solids; and utilize software features to determine the mass properties of a three-dimensional solid models.
Utilize descriptive geometry techniques to draft three-dimensional intersections and developments.
Compose axonometric, oblique and perspective view drawings.
Construct orthographic, isometric and auxiliary view drawings utilizing parametric modeling software.
Develop three-dimensional drawings to include assembly drawings using parametric constraint/ modeling techniques.
Make sections, profiles and cut away views of three-dimensional objects, including constrained drawings.
Apply intermediate to advanced rendering, shading and animation techniques to optimize technical design presentations.
Use various display, drawing and plotter parameters and commands to satisfy the specific requirements of a 3D design/drafting assignment.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

TDD 225 Computer Aided Drafting
An introduction to computer-aided drafting through familiarization with computers and software used, and investigation of the knowledge and skills required of an operator of computer-aided drafting systems. Emphasis is on the IBM microcomputer-based systems, which will be learned through accomplishment of a series of increasingly complex drafting assignments. NOTE: Prerequisites: TDD 124, or architectural drafting course, or drafting experience.
Upon successful completion of this course, students should be able to:
Identify the components of a typical computer-aided drafting system.
Boot up (start) the system in preparation for beginning a new drawing or editing an existing drawing.
Identify a drawing, establish drawing parameters and use menus or commands appropriately to begin work on the drawing.
Enter pertinent data for the drafting assignment, using absolute and relative coordinates, last coordinates, keyboard and digitizing or pointing devices.
Operate the display controls including WINDOW, PAN and other drawing and screen control commands to satisfy the specific requirements of the drafting assignment.
Modify and correct drawings using the edit commands.
Provide dimensions, notes, bills of materials and other text on drawings as necessary to satisfy the information requirements of manufacturing or construction.
Use drawing libraries composed of standard shapes and components, or previously prepared drawings to insert desired information and entities in current drawings.
Plan, lay out and complete the necessary drawings to describe a design, manufacturing or construction project selected by the student as an individual or as a member of a planning group.
Save (on disk) and plot drawings produced with the microcomputer-based systems.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

TDD 227 Advanced CADD
This course provides students with computer-aided drafting design (CADD) software customization techniques. Emphasis includes improvement of software function via menu customization, proper installation of the software, macro programming and management of electronic files. Additionally, activities associated with the evaluation of newly evolving CADD related systems provide skills appropriate for identifying specialized design and drafting career opportunities.
Upon successful completion of this course, students should be able to:
Use a text editor to create and modify computer software files.
Write macros to simplify CADD system operations and maximize speed and accuracy.
Structure and edit menus to enhance CADD software module access and performance capabilities.
Customize CADD support files such as prototype drawings, line types, hatches, text fonts, and styles and slide libraries.
Create customized CADD Help files, icon and menus.
Assemble a career growth portfolio to represent expertise in CADD customization.
Develop a methology for evaluating new computer software and related technologies for computer-aided drafting and design.
Utilize object linking and extracting technology to create integrated graphics/ textual databases for productivity optimization.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours