

SECTION 4

STATE APPROVED CTE PROGRAMS

Description of State Approved CTE Programs

The OCTE provides technical assistance and support for the improvement of existing state approved CTE programs and the development of new CTE programs for secondary students attending career centers, ISDs, and local school districts in Michigan. A current listing of the CTE programs eligible to receive funding is located on the OCTE website.

Students enrolled in state approved secondary CTE programs have an opportunity to acquire skills that prepare them for successful career entry, advancement, and/or continuing education. CTE program choices should relate to the career goals identified in the students' EDP. These skills should be transferable, as well as career specific and basic to students' education, providing them with a foundation for lifelong learning and career employability.

Each state approved program is required to integrate four key components of a successful program.

1. Integration of academic and technical skills to support core knowledge needs.
2. Laboratory hands-on learning to develop skills.
3. Work Based Learning opportunities to further develop and apply skills.
4. Student leadership opportunities to support employability and career readiness skills.

The primary objectives for secondary CTE programs are:

- To provide students the skills needed for employment now, and broad transferable academic, employability and career skills, allowing students further employment and education flexibility.
- To acquire an awareness of the structure and future trends within high-skill, high-wage and in-demand industries, to increase student options for occupational choice in the pursuit of a career and provide the requisite knowledge and skills for continued advanced education and training.
- To provide classroom, leadership, and WBL experiences to bridge the gap between education and the world of work.

All state approved CTE programs have been aligned by the OCTE with the following 17 career clusters:

- Agriculture, Food and Natural Resources
- Architecture and Construction
- Arts, A/V Technology and Communications
- Business, Management and Administration
- Education & Training
- Energy
- Finance
- Government and Public Administration
- Health Science
- Hospitality and Tourism
- Human Services
- Information Technology
- Law, Public Safety, Corrections & Security
- Manufacturing
- Marketing
- Science, Technology, Engineering and Mathematics
- Transportation, Distribution and Logistics

These 17 career clusters provide a useful framework to aid both students and educators in making those meaningful connections to the current and emerging world of work, leading to students being successful in a career of choice and lifelong learning.

DEFINITION OF CTE PROGRAMS

To be approved and eligible for funding by the State of Michigan, a State Approved CTE program must be a program that prepares students to earn a wage (except for 19.0000 Family and Consumer Sciences). A CTE program must have a federal U. S. Department of Education CIP Code number and descriptor. All CTE programs include classroom, leadership, and laboratory experiences and Work Based Learning instruction. Instruction must be competency-based and aligned with state level CIP- specific CTE program standards, as defined by the OCTE.

[GEMS](#) for Michigan's CTE community (state, local, and regional CTE administrators and instructors), provides real-time access to Michigan's state approved monitoring process. This is necessary for educational decision-making, management, and ultimately student achievement. This comprehensive, statewide, web-based system is user-friendly, instructor-driven, and can be used for managing the technical standards, career cluster content, segments, resource content, and academic alignment results for all of Michigan's CTE program areas.

[GEMS](#) provides Michigan CTE programs with the capability of listing programs by Cluster and CIP Code. A list of the minimum standards (Michigan Technical Skills, National Cluster, Pathway, and Career Ready Practices) is available for each CIP. Teachers have the capability of adding resources that they would use to deliver the standards (images, documents, presentations, and lesson plans). For monitoring purposes, the CIP Self-Review must be completed for each state approved program.

Family and Consumer Science (FCS) is a non-wage earning CTE program but, with CEPD Option, State School Aid Section 61a(1) funding is available to programs with existing approval. New program applications will not be accepted. FCS CTE (CIP Code 19.0000) programs should include classroom and laboratory experiences. Instruction must follow the FCS Gap Analysis and the program must consist of at least four classes. One of those classes must be Parenthood Education. For more information regarding FCS programs, contact the Program Consultant, Candace Vinson, at VinsonC@michigan.gov.

For information on developing new CTE programs, refer to [Section 5](#) of this manual.

CIP SELF-REVIEW PROGRAM CRITERIA

A CTE CIP Self-Review must be completed annually for all State Approved CTE programs with any student enrollment. This excludes new and emerging programs. A regional CIP Self-Review Summary Report must be completed by June 30th of each year for the selected 20% of State Approved CTE programs in the region. A description of each area of the CIP Self-Review Criteria may be found in [Section 5](#) of this Manual. Please note that FCS programs have different criteria.

CTE CURRICULUM INTEGRATION

CTE, integrated course sequences, and project-based learning are delivery models in which students may earn full or partial Michigan Merit Curriculum (MMC) Credit by successfully demonstrating that they have met subject area content standards. The assignment of credit must be based, in part, on student performance on an assessment that measures student achievement of those standards. These programs give students the opportunity to apply academic content in real-world situations to demonstrate proficiency. Students must complete all the high school credit requirements at the same level of performance as required of all Michigan students. CTE students must also meet the technical standards and certification requirements of their chosen field of technical study.

[CTE MMC Exchange Credits](#)

[Integrated Credits Guidelines for Awarding Credit](#)

[Collaborative Model Guidelines for Awarding Credit](#)

https://www.michigan.gov/mde/0,4615,7-140-28753_38924---,00.html

[Michigan Merit High School Graduation Requirements Frequently Asked Questions:](#)

https://www.michigan.gov/documents/mde/Complete_MMC_FAQ_August_2014_467323_7.pdf

PROGRAM CONCENTRATOR – PROGRAM COMPLETER DEFINITIONS –

The definition of a program concentrator and program completer are as follows:

Concentrator – Perkins VI to V Transition Definition

For programs reporting under Segments

A student who has successfully completed, with a grade of C (2.0) or better, courses totaling 8 segments of instruction – regardless of the number of courses taken.

For programs reporting under Perkins V Courses

A student served by an eligible recipient who has completed at least 2 courses in a single career and technical education program of study; and

Completer– Perkins VI to V Transition Definition

For programs reporting under Segments

A student who has successfully completed, with a grade of C (2.0) or better, courses totaling all 12 segments of instruction.

For programs reporting under Perkins V Courses

This definition has not yet been determined. Programs will not be reporting under Perkins V courses until Fall 2021.

CAREER CLUSTERS

The States' Career Clusters Initiative was designed and developed under a cooperative agreement with the Office of Vocational and Adult Education, by the

U. S. Department of Education. The initiative is now managed by the National Association of State Directors of Career and Technical Education Consortium.

A career cluster is a grouping of occupations and broad industries based on commonalities. The career clusters provide an organizing tool for schools. The cluster foundations represent the knowledge and skills, both academic and technical, that all students within the cluster should achieve regardless of the career specialty chosen. The cluster Pathways within the clusters represent the knowledge and skills necessary to pursue a full range of career opportunities, ranging from entry level to management, including technical and professional career specialties. The career specialties represent the full range of career opportunities within each cluster pathway.

There is no educational level to the clusters. Acceptance of these among secondary and postsecondary institutions can easily aid the seamless transition from secondary to postsecondary. All cluster foundations support the Michigan Merit Curriculum Academic Content Standards for high school students.

The clusters are the first national approach to a set of standards in CTE with continuity between and among occupations. All clusters are in the same format, using knowledge and skill statements, performance elements, and sample indicators, thus assuring some standardization in requirements among clusters.

Each cluster is divided into multiple cluster pathways (sections) to provide students a clear focus in specialized occupational areas.

Michigan utilizes 17 career clusters. There are many benefits to Michigan students using the cluster framework. Some of these benefits are outlined below:

- Clusters were produced by nationally represented advisory committees using state and national standards that already existed. These committees were composed of experts and leaders in their fields nationally.
- Clusters have all been cross-walked with national resources and federal CIP codes.
- Once developed, they were validated electronically nationwide, and are revalidated approximately every three years.
- Solid postsecondary, secondary, and business and industry representation assured all parties had input in development of the POS.
- Career clusters are being embraced all over the country in state-to-state standards alignment.
- Clusters are the first national approach to a teachable set of standards with continuity.
- Portability of credentials within the state and state-to-state are now possible in state approved CTE programs.
- All the states and territories have contributed funds to the National Association of State Directors of Career and Technical Education Consortium for continuation of the cluster concept.
- Several clusters are currently forming an assessment tool that may offer a national credential to students.
- All OCTE Consultants are using the National Clusters to approve new programs.

All secondary state approved CTE programs in Michigan align their curriculum to the related CTE program standards are available on the [MDE OCTE Standards page](#).
[GEMS](#)

AGRICULTURE, FOOD AND NATURAL RESOURCES

The production, processing, marketing, distribution, financing, and development of agricultural commodities and resources including food, fiber, wood products, natural resources, horticulture, and other plant and animal products and resources.

Programs in this cluster should provide an extend program for the teaching staff. This will allow for the enhancement of student learning outstand of the traditional school day and year. It is recommended that eight weeks be provided for staff that teach 100% in

this cluster.

01.0000 Agriculture, Agriculture Operations and Related Sciences

A program that focuses on the general principles and practice of agricultural research and production to prepare individuals to apply this knowledge to the solution of practical agricultural problems. This program includes instruction in basic animal, plant, and soil science, animal husbandry and plant cultivation, soil conservation, natural resources, and agricultural operations such as farming, ranching, and agricultural business.

01.0601 Applied Horticulture and Horticulture Operations

A program focusing on the general production and processing of domesticated plants, shrubs, flowers, foliage, trees, ground covers, and related plant materials, the management of technical and business operations connected with horticultural services, and the basic scientific principles needed to understand plants and their management and care.

01.0903 Animal Health and Veterinary Science

A program that focuses on the application of biological and chemical principles to the study, prevention, and control of diseases in agricultural and companion animal populations. Includes instruction in environmental science, pharmacology, animal population studies, genetics, animal physiology and diet, disease prevention, treatment methodologies, and laboratory and testing procedures.

03.0000 Natural Resources and Conservation

A program that focuses on the studies and activities relating to the natural environment and its conservation, use, and improvement. It includes instruction in subjects such as climate, air, soil, water, land, fish and wildlife, and plant resources, basic principles of environmental science and natural resources management, and the recreational and economic uses of renewable and nonrenewable natural resources.

26.1201 Biotechnology

A laboratory-based program preparing students for work in the science, technology, and business of the biotechnology industry related to plants, animals, and renewable fuels. Instruction includes an overview of the biotechnology industry, standard laboratory practices, and organisms used in research, DNA and protein manipulation, assays, genetic engineering, product development and marketing, and industrial applications.

ARCHITECTURE AND CONSTRUCTION

Careers in designing, planning, managing, building, and maintaining the build environment.

15.1301 Drafting and Design Technology/Architectural

This program prepares individuals to generally apply technical skills to create working drawings and computer simulations for a variety of applications. Instruction includes specification interpretation, dimensioning techniques, drafting calculations, material estimation, technical communications, computer applications, and interpersonal communications.

19.0605 Home Furnishings Equipment Installers and Consultants

This program prepares individuals to assist in home furnishings and decorations. Instruction includes selecting, purchasing, and designing home furnishings, decorations, and equipment, floral design, accessory construction, textiles, and upholstery.

46.0000 Construction Trades

This program generally prepares individuals to apply technical knowledge and skills in the building, inspecting, and maintaining of structures and related properties.

The program may include instruction in masonry, carpentry, electrical and power transmission installation, building/construction finishing, management, inspection, and applicable codes and standards.

46.0301 Electrical and Power Transmission Installation

This program generally prepares individuals to apply technical knowledge and skills to install indoor and outdoor residential, commercial, and industrial electrical systems, and associated power transmission lines. Includes instruction in electricity, safety, safety procedures, wiring, insulation and grounding, schematic blueprint interpretation, equipment operation and maintenance and applicable codes and standards.

46.0503 Plumbing Technology

A program that prepares individuals to practice as licensed plumbers by applying technical knowledge and skills to lay out, assemble, install, and maintain piping fixtures and systems for steam, natural gas, oil, hot water, heating, cooling, drainage, lubricating, sprinkling, and industrial processing systems in home and commercial environments. Instruction includes source determination, water distribution, waste removal, pressure adjustment, basic physics, technical mathematics, blueprint reading, pipe installation, pumps, welding and soldering, plumbing inspection, and applicable codes and standards.

47.0201 Heating, Air Conditioning, Ventilation and Refrigeration

A program that prepares individuals to apply technical knowledge and skills to repair, install, service, and maintain the operating condition of heating, air conditioning, and refrigeration systems. Includes instruction in diagnostic techniques, the use of testing equipment and the principles of mechanics, electricity, and electronics as they relate to the repair of heating, air conditioning, and refrigeration systems.

ARTS, A/V TECHNOLOGY AND COMMUNICATIONS

Designing, producing, exhibiting, performing, writing, and publishing multi, broadcast and social media content that includes visual and performing arts and design, journalism, and entertainment services.

19.0906 Fashion Design

A program that prepares individuals to assist in apparel and fashion selection with traditional training in the use of digital production equipment and technology, style coordination, sales, personal shopping and consulting, fabric selection, clothing, accessories, and buying activities. Instruction may also include home furnishing, interior design and decorating. Specialized instruction in event planning.

10.0202 Radio and Television Broadcasting Technology

A program that prepares individuals to apply technical, broadcast journalism knowledge, and skills to the production of radio television broadcast media, social media, and related operations under the supervision of broadcast and studio managers, directors, editors, and producers. Includes instruction in writing and reporting, sound, lighting, camera operations and maintenance, audio recording and production, digital media, control room and studio operations, pre-and post- production. Will also include broadcast engineering, related computer applications and specialized training in communication and networking, social media content production, news, entertainment, live talk, sports, commercials and film.

10.0301 Graphics and Printing Technology and Communications

This program prepares individuals to apply technical knowledge and skills in the manufacturing and distribution or transmission of graphic communications products. Includes traditional and digital instruction in the pre-press, press and post press phases of production operations, and processes such as, offset lithography, flexography, gravure, letterpress, screen printing, photography, foil stamping, digital imaging, and other reproduction methods.

50.0101 Visual and Performing Arts

A general theater, visual and performing arts program that prepares individuals in any of the artistic media or performing disciplines. May also include, dance, choreography, stage production, talent agent, make-up artistry, directors, writers, composers and costume design.

BUSINESS MANAGEMENT AND ADMINISTRATION

Careers in planning, organizing, directing, and evaluating business functions essential to efficient and productive business operations.

52.0299 Business Administration Management and Operations

This program prepares individuals to plan, manage, supervise, and market business operations, products, and services. Includes instruction in business administration, information management, human resource management, business law, ethics, business communications utilizing application software, preparing and delivering presentations, planning and organizing projects, and decision making in a business environment.

EDUCATION AND TRAINING

Planning, managing, and providing education and training services and related learning support services such as administration, teaching/training, administrative support, and professional support services.

13.0000 Education, General

This program introduces students to employment possibilities in the field of education/training. The program prepares individuals to begin their formal preparation for careers in teaching/training, administration of teaching/training programs, and/or support services for education/training programs.

ENERGY

Prepares individuals for careers in the designing, planning, maintaining, generating, transmission, and distribution of traditional and alternative energy.

46.0303 Line Worker

A program that prepares individuals to apply technical knowledge and skills to install, operate, maintain and repair local, long-distance, and rural electric power cables and communication lines; erect and construct pole and tower lines; and install underground lines and cables. Includes instruction in cable installation and repair, fiber-optic technology, trenching, mobile equipment and crane operation, high-voltage installations, maintenance and inspection, safety, remote communications, and applicable codes and standards.

46.0502 Pipefitting/Pipefitter and Sprinkler Fitter

A program that prepares individuals to design, install, and test industrial and commercial piping systems and automatic fire and exposure protection systems. Includes instruction in water systems, steam systems, heating and cooling systems, lubricating systems, piping materials, installation tools operation and maintenance, valve installation and repair, technical mathematics, blueprint interpretation, and applicable codes and standards.

FINANCE

Careers in planning, services for financial and investment planning, banking, insurance, and business financial management.

52.0800 Finance and Financial Management Services

A program that prepares individuals to plan, manage, and analyze the financial and monetary aspects and performance of business enterprises, banking institutions, or other organizations. Includes instruction in principles of accounting, financial instruments, capital planning, funds acquisition, asset and debt management, budgeting, financial analysis, and investments and portfolio management.

52.1701 Insurance

A program that prepares individuals to manage risk in organizational settings and provide insurance and risk-aversion services to businesses, individuals, and other organizations. Includes instruction in casualty insurance and general liability, property insurance, employee benefits, social and health insurance, loss adjustment, underwriting, risk theory, and pension planning.

GOVERNMENT AND PUBLIC ADMINISTRATION

Planning and executing government functions at the local, state and federal levels, including governance, national security, foreign service, planning, revenue and taxation, and regulations.

28.0301 Army (JROTC)

A program that introduces students to the theory and practice of military science, life in the U.S. Army, and prepares them for cadet status (Junior ROTC or JROTC) or for service as commissioned reserve or active duty officers (Senior AROTC or ROTC). Programs are offered as adjuncts to regular high school or college instructional programs.

HEALTH SCIENCE

Planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.

26.0102 Biomedical Sciences, General

A general, program that focuses on the integrative scientific study of biological issues related to health and medicine, or a program in one or more of the biomedical sciences that is undifferentiated as to title. Includes instruction in any of the basic medical sciences at the research level, biological science research in biomedical faculties, and general studies encompassing a variety of the biomedical disciplines.

51.0000 Health Services/Allied Health/Health Sciences, General

A general, introductory, undifferentiated, or joint program in health services occupations that prepares individuals for either entry into specialized training programs or for a variety of concentrations in the allied health area. Includes instruction in the basic sciences, research and clinical procedures, and aspects of the subject matter related to various health occupations.

51.0707 Health Information/Medical Records Technology/Technician

A program that prepares individuals, under the supervision of health information administrators and other professionals, to construct medical records and clinical databases, perform manipulations on retrieved data, control the security and quality of records, and supervise data entry and technical maintenance personnel. Includes instruction in clinical and biomedical science data and information requirements, database management, data coding and validation, information security, quality control, health information content and structure, medical business procedures, and legal requirements.

51.1000 Clinical/Medical Laboratory Science/Research and Allied Professions

A program that prepares students to test biological specimens to gather information about patient conditions, analyze for abnormalities or other problems using special mechanical or electrical devices, understand and interpret requests for procedures, and plan for implementation of services and procedures. Instruction includes healthcare safety and maintenance practices, ethical and legal responsibilities, problem solving and critical thinking, technology applications, biology, and chemistry.

HOSPITALITY AND TOURISM

Preparing individuals for employment in career pathways that relate to families and human needs such as restaurant and food/beverage services, lodging, travel and tourism, recreation, amusement, and attractions.

12.0500 Cooking and Related Culinary Arts, General

A program that focuses on the general study of the cooking and related culinary arts, and that may prepare individuals for a variety of jobs within the food service industry. Includes instruction in food preparation, cooking techniques, equipment operation and maintenance, sanitation and safety, communication skills, applicable regulations, and principles of food service management.

HUMAN SERVICES

This diverse career cluster prepares individuals for employment in career pathways related to families and human needs.

12.0401 Cosmetology

A program that generally prepares individuals to cut, trim, and style scalp, facial, and body hair, apply cosmetic preparations, perform manicures and pedicures, massage the head and extremities, and prepare for practice as licensed cosmetologists in specialized or full-service salons. It includes instruction in hair cutting and styling, manicures, pedicures, facial treatments, shampooing, chemical applications, esthetics, shop management, sanitation and safety, customer service, and applicable professional and labor laws and regulations.

INFORMATION TECHNOLOGY

Building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

11.0201 Computer Programming/Programmer

This program focuses on the general writing and implementation of generic and customized programs to drive operating systems and that generally prepares individuals to apply the methods and procedures of software design and programming to software installation and maintenance. Includes instruction in software design, low- and high-level languages and program writing; program customization and linking; prototype testing; troubleshooting; and related aspects of operating systems and networks.

11.0801 Digital/Multimedia and Information Resources Design

This program prepares individuals to apply HTML, XML, JavaScript, graphics applications, and other authoring tools to the design, editing, and publishing (launching) of documents, images, graphics, sound, and multimedia products on the World Wide Web. Includes instruction in Internet theory, web page standards and policies, elements of web page design, user interfaces, vector tools, special effects, interactive and multimedia components, search engines, navigation, morphing, e-commerce tools, and emerging web technologies.

11.0901 Computer Systems Networking and Telecommunications

This program focuses on the design, implementation, and management of linked systems of computers, peripherals, and associated software to maximize efficiency and productivity, and that prepares individuals to function as network specialists and managers at various levels. Includes instruction in operating systems and applications; systems design and analysis; networking theory and solutions; types of networks; network management and control; network and flow optimization; security; configuring; and troubleshooting.

11.1001 Systems Administration/Administrator

This program will prepare individuals to manage the computer operations and control the system configurations emanating from a specific site or network hub. Includes instruction in computer hardware and software and applications; local area (LAN) and wide area (WAN) networking; principles of information systems security; disk space and traffic load monitoring; data backup; resource allocation; and setup and takedown procedures.

11.1003 - Computer and Information Systems Security/Information Assurance

A program that prepares individuals to assess the security needs of computer and network systems, recommend safeguard solutions, and manage the implementation and maintenance of security devices, systems, and procedures. Includes instruction in computer architecture, programming, and systems analysis; networking; telecommunications; cryptography; security system design; applicable law and regulations; risk assessment and policy analysis; contingency planning; user access issues; investigation techniques; and troubleshooting.

LAW, PUBLIC SAFETY, CORRECTIONS AND SECURITY

Planning, managing, and providing legal, public safety, protective services, and homeland security, including professional and technical support services.

43.0100 Public Safety/Protective Services

A program that prepares individuals to apply theories and practices of organization management and criminal justice to the administration of public law enforcement agencies and operations. Includes instruction in law enforcement history and theory, operational command leadership, administration of public police organizations, labor relations, incident response strategies, legal and regulatory responsibilities, budgeting, public relations, and organizational leadership.

MANUFACTURING

Planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and manufacturing/process engineering.

47.0101 Electrical/Electronics Equipment Installation and Repair, General

A program that generally prepares individuals to apply technical knowledge and skills to operate, maintain, and repair electrical and electronic equipment.

Instruction includes electrical circuitry, simple gearing, linkages and lubrication of machines and appliances, and the use of testing equipment.

48.0501 Machine Tool Technology/Machinist

A program that prepares individuals to apply technical knowledge and skills to plan, manufacture, assemble, test, and repair parts, mechanisms, machines, and structures in which materials are cast, formed, shaped, molded, heat treated, cut, twisted, pressed, fused, stamped, or worked.

48.0508 Welding, Brazing, and Soldering

This program prepares individuals to apply technical knowledge and skills to join or cut metal surfaces. Includes instruction in arc welding, resistance welding, brazing and soldering, cutting, high-energy beam welding and cutting, solid state welding, ferrous and non-ferrous materials, oxidation-reduction reactions, welding metallurgy, welding processes and heat treating, structural design, safety, and applicable codes and standards.

48.0701 Woodworking, General

A program that generally prepares individuals to apply technical knowledge and skills to lay out and shape stock, assemble wooden articles or subassemblies, mark, bind, saw, carve, and sand wooden products, repair wooden articles, and use a variety of hand and power tools.

MARKETING

Planning, managing, and performing marketing activities to reach organizational objectives such as brand management, professional sales, merchandising, marketing communication, and market research.

52.1999 Specialized Merchandising, Sales, and Marketing Operations, Other

This program focuses on planning, managing, and performing wholesaling and retailing services and related marketing and distribution support services including merchandise/product management and promotion. Various specialty areas are included. Skills acquired in this program include customer service, management, problem solving, process/system thinking, project management, communication, decision making, and entrepreneurship.

SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS

Planning, managing, and providing scientific research and professional and technical services (e.g., physical science, social science, engineering) including laboratory and testing services and research and development services.

14.4201 Mechatronics

A program that prepares individuals to apply mathematical and scientific principles to the design, development, and operational evaluation of computer controlled electromechanical systems and products with embedded electronics, sensors, and actuators, and which includes, but is not limited to, automated robots and automation systems. Instruction includes mechanical engineering, electronic and electrical engineering, computer and software engineering, and control engineering.

15.0000 Engineering Technology

A program that generally prepares individuals to apply basic engineering principles and technical skills in support of engineers engaged in a wide variety of projects.

Instruction includes various engineering support functions for research, production, and operations and applications to specific engineering specialties.

15.1306 Mechanical Drafting

A program that prepares individuals to apply technical knowledge and skills to develop working drawings and electronic simulations in support of mechanical and industrial engineers and related professionals. Instruction includes manufacturing materials and processes, mechanical drafting, electrode-mechanical drafting, basic metallurgy, geometric dimensioning and tolerancing, blueprint reading, and technical communication.

TRANSPORTATION, DISTRIBUTION AND LOGISTICS

Planning, management, and movement of people, materials, and goods by road, pipeline, air, rail, and water and related professional and technical support services such as transportation infrastructure planning and management, logistics services, mobile equipment, and facility maintenance.

49.0101 Aeronautics/Aviation/Aerospace Science and Technology

A program that focuses on the general study of aviation and the aviation industry, including in-flight and ground support operations. Includes instruction in the technical, business, and general aspects of air transportation systems.

47.0399 Heavy/Industrial Equipment Maintenance Technologies

This program prepares individuals to apply technical knowledge and skills in the field of maintenance and repair of heavy equipment and in the general maintenance and overhaul of such equipment. It includes instruction in inspection, maintenance, and repair of tracks, wheels, brakes, operating controls, pneumatic and hydraulic systems, electrical circuitry, and engines and techniques of welding and brazing.

47.0603 Collision Repair Technician (ASE Certified)

A program that prepares individuals to apply technical knowledge and skills to repair, reconstruct, and finish automobile bodies, fenders, and external features. Instruction includes structure analysis, damage repair, non-structural analysis, mechanical and electrical components, plastics and adhesives, painting and refinishing techniques, and damage analysis and estimating.

47.0604 Automobile Technician (ASE Certified)

This program prepares individuals to apply technical knowledge and skills to repair, service, and maintain all types of automobiles. Instruction includes brake systems, electrical systems, engine performance, engine repair, suspension and steering, automatic and manual transmissions and drive trains, and heating and air conditioning systems.

47.0606 Small Engine and Related Equipment Repair

A program that prepares individuals to apply technical knowledge and skills to repair, service, and maintain small internal combustion engines used on portable power equipment such as lawnmowers, chain saws, rotary tillers, and snowmobiles.

47.0607 Airframe Technology

This program prepares individuals to apply technical knowledge and skills to repair, service, and maintain all aircraft components other than engines, propellers, avionics, and instruments. Instruction includes layout and fabrication of sheet metal, fabric, wood, and other materials into structural members, parts, and fittings, and replacement of damaged or worn parts such as control cables and hydraulic units.

47.0608 Power Plant Technology (Aircraft)

A program that prepares individuals to apply technical knowledge and skills to repair, service, and maintain all types of aircraft power plant and related systems. Includes instruction in engine inspection and maintenance, lubrication and cooling, electrical and ignition systems, carburetion, fuels and fuel systems, propeller and fan assemblies.

47.0609 Avionics Maintenance Technology

This program prepares individuals to apply technical knowledge and skills to repair, service, and maintain all types of aircraft operating, control, and electronic systems. Instruction includes flight instrumentation, aircraft communications and homing systems, radar and other sensory systems, navigation aids, and specialized systems for various types of civilian and military aircraft.

47.0613 Medium/Heavy Truck Technician

This program prepares individuals to apply technical knowledge and skills to the specialized maintenance and repair of trucks, buses, and other commercial and industrial vehicles. Instruction includes diesel engine mechanics, suspension and steering, brake systems, electrical and electronic systems, preventive maintenance inspections, drive trains, gasoline engine mechanics, HVAC systems, and auxiliary equipment installation and repair.

FAMILY AND CONSUMER SCIENCES

19.0000 Family and Consumer Sciences

This program allows students the opportunity to develop knowledge and skills to become contributing members of society and function in multiple roles in day-to-day living and employment throughout their life. FCS education provides a foundation for achievement of life goals and assumption of future role responsibilities. If FCS programs are prioritized at the local level, they could generate funds and may qualify for State School Aid Section 61a funding for Parenthood Education, if all requirements are met.

Additional information about FCS programs may be found on the [MDE-OCTE website](http://www.michigan.gov/mde/0,4615,7-140-6530_2629_53968---,00.html) at: http://www.michigan.gov/mde/0,4615,7-140-6530_2629_53968---,00.html.