Career-Technical Credit Transfer (CT)²
Programming Career-Technical Assurance Guide (CTAG)
March 25, 2016

The following courses, indicated by a Career-Technical Articulation Number (CTAN), are eligible for post-secondary credit and transfer among Ohio's Public Secondary career-technical institutions and state institutions of higher education.

CTPROG001 Computer Logic	**Credits: 3 Semester Hours**
Advising Notes: In order to access post-secondary college credit for this CTAN, the **student** must: • Matriculate to an institution of higher education with an approved or comparable program no later than 3 years after completing the approved secondary program • Successfully complete the ODE secondary course **[Programming (145060)]** and receive a qualifying/passing score of ***55 or higher*** on the "End of Course" examination	**CERTIFICATE OF AFFIRMATION** can be used for course submission through CEMS. https://www.ohiohighered.org/transfer/ct2/affirmation.
CTPROG002 Java Programming	**Credits: 3 Semester Hours**
Advising Notes: To gain institutional approval for this CTAN, the **institution** must: • Make a course submission to the faculty review panel through the Course Equivalency Management System (CEMS) • Clarify when submitting the ODE course, **Object Oriented Programming (145065)** a matching course, if they are teaching Java or C++ Programming language. The submitting institution may not use the same ODE course for both CTANs. • Cover learning outcome #8, "Use data structures in program development" **Programs are encouraged to offer the pre-requisite, Computer Logic, before, CTAN CTPROG002-Java Programming** In order to access post-secondary college credit for this CTAN, the **student** must adhere to the following: • Matriculate to an institution of higher education with an approved or comparable program no later than 3 years after completing the approved secondary program Successfully complete the approved ODE secondary course **[Object Oriented Programming (145065)]** and receive a qualifying/passing score of ***55 or higher*** on the "End of Course" examination	**CERTIFICATE OF AFFIRMATION** can be used for course submission through CEMS. https://www.ohiohighered.org/transfer/ct2/affirmation.

CTPROG003 C++ Programming	Credits: 3 Semester Hours
Advising Notes: To gain institutional approval for this CTAN, the **institution** must: • Make a course submission to the faculty review panel through the Course Equivalency Management System (CEMS) • Clarify when submitting the ODE course, **Object Oriented Programming (145065)** a matching course, if they are teaching Java or C++ Programming language. The submitting institution may not use the same ODE course for both CTANs. Programs are encouraged to offer the pre-requisite, Computer Logic, before, CTAN CTPROG003- C++ Programming In order to access post-secondary college credit for this CTAN, the **student** must: • Matriculate to an institution of higher education with an approved or comparable program no later than 3 years after completing the approved secondary program • Successfully complete the ODE secondary course **[Object Oriented Programming (145065)]** and receive a qualifying/passing score of **55 or higher** on the "End of Course" examination	**CERTIFICATE OF AFFIRMATION** can be used for course submission through CEMS. https://www.ohiohighered.org/transfer/ct2/affirmation.

CTIT012 Microsoft .NET Fundamentals	Credits: 3 Semester Hours
Advising Notes: To gain institutional approval for this CTAN, the **institution** must: • Make a course submission to the faculty review panel through the Course Equivalency Management System (CEMS) • Offer the ODE secondary course **[Visual Programming (145070)]** In order to access post-secondary college credit for this CTAN, the **student** must: • Matriculate to an institution of higher education with an approved or comparable program no later than 3 years after completing the approved secondary program • Successfully complete the ODE secondary course **[Visual Programming (145070)]** and receive a qualifying/passing score of ***50 or higher*** on the "End of Course" examination **OR** provide proof of successful completion of the MTA Exam 98-372 (Microsoft .NET Fundamentals) or current equivalent	**CERTIFICATE OF AFFIRMATION** can be used for course submission through CEMS. https://www.ohiohighered.org/transfer/ct2/affirmation.

The CTAN identifies the learning outcomes that are equivalent or common in introductory technical courses. In order for students to receive credit under these agreements, the career-technical secondary programs and the post-secondary institutions must document that their course/program content matches the learning outcomes in the CTANs. In accordance with ORC 3333.162, industry standards and certifications provide documentation of student learning. Recognized industry standards are expectations established by business, industry, state agencies, or professional associations that define training program curricular requirements, establishes certification or licensure criteria, and often serves as the basis for program accreditation.

Requirements and Credit Conditions:

1. The receiving institution must have a comparable program, major, or courses that have been approved through submission to the Ohio Department of Higher Education $(CT)^2$ approval process for the CTANs listed in this document.
2. Credits apply to courses in the specified technical area at Ohio's public institutions of higher education, provided that the institution offers courses in the specific technical area. In the absence of an equivalent course, and when the institution offers the technical program, the receiving institution will guarantee to grant and apply an equivalent credit value of the Career-Technical Articulation Number (CTAN) toward the technical requirements of the specific degree/certificate program.
3. The applicant must provide proof to the receiving institution that she/he completed a course or program that has been approved through the $(CT)^2$ approval process and that she/he holds the appropriate credential or has passed the end-of-course assessment(s).
4. A career-technical student seeking credit under the terms of this CTAG must apply and be accepted to the college within three years of completing a career-technical education program/course or within the currency of the industry certificate or license.
5. A career-technical student who meets all eligibility criteria will receive the credit hour value for the comparable course(s) as offered at the receiving state institution of higher education.
6. The admission requirements of individual institutions and/or programs are unaffected by the implementation of $(CT)^2$ outcomes.
7. The transfer of credit through this CTAG will not exempt a student from the residency requirements at the receiving institution

Secondary Career-Technical students must complete the Information Technology Pathway to be eligible for credit under this CTAG. This pathway is outlined in the Ohio Department of Education's *Information Technology Career Field Technical Content Standards.*

CTPROG001 – Computer Logic | Credits: 3 Semester Hours

General Course Description: This course introduces students to the concepts of logic in computer programming design. Students will use tools such as flowcharts and pseudocode to model problem solutions. The course will cover logic structures such as sequencing, selection and looping. Students will also learn about data types, arrays, and using variables for input/output operations. Data validation and program debugging techniques will also be covered.

Credits: 3 Semester Hours

Learning Outcomes:

1. *Describe the Process of Program Development
2. *Identify programming languages and their applications
3. *Use modeling tools to design program solutions
4. *Identify data types and use variables for input and output operations
5. *Identify and use arrays
6. *Identify and use logic structures
7. *Describe and use error-checking and data validation
8. *Create program documentation
9. *Create and use functions and modules

Asterisk Indicates Essential Learning Outcomes

CTPROG002 – Java Programming | Credits: 3 Semester Hours

General Course Description: This course introduces object-oriented concepts such as instantiation, polymorphism, inheritance, and encapsulation. Students will learn how to create classes, objects and methods. Java data types, data structures, and events will be covered. Students will use Java to create console, desktop, and mobile applications.

Credits: 3 Semester Hours

Learning Outcomes:

1. *Apply object oriented concepts to develop programs, including encapsulation, abstraction, inheritance, polymorphism, and interfaces.
2. *Use development tools to develop programs
3. *Create classes, objects, and methods using an object oriented language
4. *Use primitive and reference data types in computational and string operations
5. *Use error checking and exception handling in program development
6. *Debug and test program code
7. *Test and validate program output
8. *Use data structures in program development
9. *Use I/O methods to develop programs
10. *Write executable object oriented source code

Asterisk Indicates Essential Learning Outcomes

CTPROG003 – C++ Programming | Credits: 3 Semester Hours

General Course Description: This course introduces object-oriented concepts such as instantiation, polymorphism, inheritance, and encapsulation. Students will learn how to create classes, objects, and member functions. C++ data types, pointers, structures, and arrays will be covered. Students will use C++ to create object oriented console programs.

Credits: 3 Semester Hours

Learning Outcomes:

1. *Apply object oriented concepts to develop programs
2. *Use development tools to develop programs
3. *Create classes, objects, and methods using an object oriented language
4. *Use primitive and reference data types such as pointers in computational and string operations
5. *Use error checking and exception handling in program development
6. *Debug and test program code
7. *Test and validate program output
8. *Use data structures in program development
9. *Use logic structures to develop programs
10. *Use I/O methods to develop programs
11. *Produce object oriented source code

Asterisk Indicates Essential Learning Outcomes

CTIT012 – Microsoft .NET Fundamentals | Credits: 3 Semester Hours

General Course Description: This course uses Visual Basic .NET, as an object-oriented/event-driven environment in which to teach programming concepts. The student will use .NET applications to create and test windows based business programs.

Credits: 3 Semester Hours

Learning Outcomes:

1. *Use .NET framework concepts (i.e. basic application settings, variables and constants, basic control structures such as sequence, selection and iteration, event handling and error/exception handling)
2. *Use namespaces, classes, methods and attributes in the .NET framework
3. *Compile .NET code
4. *Use I/O classes in the .NET framework
5. *Describe .NET security

Asterisk Indicates Essential Learning Outcomes

Programming Panel Participants
Spring 2015

Bob Haas	Marion Technical Community College	SCTAI Lead Panel Expert
Mary Isabella	Columbus State Community College	SCTAI Lead Panel Expert
Todd Hernandez	Northwest State Community College	SCTAI Panel Expert
Doug Kranch	North Central State College	SCTAI Panel Expert
Yu Liang	Central State University	SCTAI Panel Expert
Russ McMahon	University of Cincinnati	SCTAI Panel Expert
Reece Newman	Sinclair Community College	SCTAI Panel Expert
Leslie Spivey	Edison Community College	SCTAI Panel Expert
Dovel Myers	Shawnee State University	Item Writer
James Reneau	Shawnee State University	Item Writer
Dr. Jim Austin	Center on Education and Training at OSU	
Brooke Parker	Center on Education and Training at OSU	
Cyndi Brill	Ohio Department of Education	Program Specialist
Aaron Stewart	Ohio Department of Education	Program Specialist
Dr. Bob Haas	Ohio Department of Higher Education	SCTAI Staff Expert
Jamilah Tucker	Ohio Department of Higher Education	Director of Career-Technical Transfer Initiatives
Anne Skuce	Ohio Department of Higher Education	Senior Associate Director of SCTAI
Misty McKee	Ohio Department of Higher Education	Assistant Director of SCTAI
Jessi Spencer	Ohio Department of Higher Education	Administrative Coordinator of SCTAI