

**Career-Technical Credit Transfer (CT)<sup>2</sup>  
Engineering and Manufacturing Technology Career-Technical Assurance Guide (CTAG)  
April 28, 2008**

The following courses, indicated by Career-Technical Articulation Numbers (CTANs), are eligible for post-secondary credit and transfer among Ohio's public secondary career-technical institutions and state institutions of higher education. The SCTAI alignment document with ODE competencies and post-secondary learning outcomes can be found on the ODHE website at <https://www.ohiohighered.org/sctai/ctags>.

<b>CTMET004 Manufacturing Processes</b>	<b>Credits: 3 Hours</b>
<p><b>Advising Notes:</b> In order to access post-secondary college credit for this CTAN, students must:</p> <ul style="list-style-type: none"> <li>• Matriculate to an institution of higher education with an approved or comparable program within 3 years of completing the approved program</li> <li>• Successfully complete the <b>ODE course Manufacturing Operations (175003)</b> with a “C” or better from an approved program and earn a qualifying score of 73 or higher on the end-of-course examination</li> </ul> <p><b>TAG course OET010</b></p>	<p><b>CERTIFICATE OF AFFIRMATION:</b> Can be used for course submission through CEMS. <a href="https://www.ohiohighered.org/transfer/ct2/affirmation">https://www.ohiohighered.org/transfer/ct2/affirmation</a></p>
<b>CTMET005 Computer Aided Design/Drafting</b>	<b>Credits: 3 Hours</b>
<p><b>Advising Notes:</b> In order to access post-secondary college credit for this CTAN, students must:</p> <ul style="list-style-type: none"> <li>• Matriculate to an institution of higher education with an approved or comparable program within 3 years of completing the approved program</li> <li>• Successfully complete the <b>ODE course Computer Integrated Manufacturing (175006)</b> with a “C” or better from an approved program and earn a qualifying score of 60 or higher on the end-of-course examination</li> </ul> <p><b>TAG course OET012</b></p>	<p><b>CERTIFICATE OF AFFIRMATION:</b> Can be used for course submission through CEMS. <a href="https://www.ohiohighered.org/transfer/ct2/affirmation">https://www.ohiohighered.org/transfer/ct2/affirmation</a></p>

Each 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 content matches the learning outcomes in the CTANs.

## 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)<sup>2</sup> 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 that has been approved through the (CT)<sup>2</sup> approval process and that she/he holds the appropriate credential or has passed the end-of-program assessment.
4. A career-technical student seeking credit under the terms of this CTAG must enroll and submit their verification form to the college within three years of completing a career-technical course. Students may earn credit 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)<sup>2</sup> 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 Engineering and Manufacturing Technology Pathway to be eligible for credit under this CTAG. This pathway is outlined in the Ohio Department of Education's *Engineering and Manufacturing Technology Career Field Technical Content Standards*.

### CTMET004 Manufacturing Processes (OET010)

Credits: 3 Semester Hours

**General Course Description:** The focus of this course is to provide the student with an introduction to common major manufacturing processes. Students will study and gain practical experience in various manufacturing processes such as metrology, materials, heat-treating, machine operations, metal forming, extrusions, castings, welding, finishing, adhesion, fasteners, assembly, and applications of empirical data to determine speeds and feeds to optimize production efficiencies. Learning outcomes are achieved through various in-class and laboratory experiences.

#### Learning Outcomes:

1. \* Demonstrate an understanding of the interrelationships between material properties and manufacturing processes.
2. \* Distinguish between different manufacturing processes such as forgings, extrusions, castings, forming, and finishing.
3. \* Distinguish between different fabrication processes such as welding, fasteners, and adhesives.
4. \* Apply process parameters to optimize production efficiencies.
5. \* Demonstrate appropriate safety procedures and methods in a manufacturing setting.
6. \* Demonstrate proficiency in the use of measurement instruments.

**\*Asterisk Indicates Essential Learning Outcomes**

**General Course Description:** This course introduces the student to the fundamental concepts used in creating computer-generated drawings using a commercial CAD software. Topics include coordinate systems, construction, text insertion, editing techniques, views, projections, display control inquiry techniques, dimensioning and use of part libraries in the creating of drawings and assemblies. Bill of materials will be generated from multi-sheet assemblies. Students will develop 3D objects using primitive solids and Boolean operations. Learning outcomes are achieved through various in class and laboratory experiences.

**Learning Outcomes:**

1. \* Demonstrate proficiency of a commercial CAD system based on ASME (ANSI) Y14.5 or equivalent ISO standards.
2. \*Create working drawings using orthographic projections, section views, and auxiliary views.
3. \*Create detail drawings that include dimensions and tolerances.
4. \*Create assembly drawings including bill of materials.
5. \*Demonstrate a basic knowledge of 3D modeling.

***\*Asterisk Indicates Essential Learning Outcomes***

## Engineering Technology Design/Writing Panel Members

### Faculty and Teachers

- Ken Bentley
  - Russell Crosthwaite
  - Jeffrey Donbar
  - Jim Gerald
  - Carl Hilgarth
  - Carol Lamb
  - Roger Newhouse
  - Toby Prinsen
  - Robert Speckert
  - Vernon Sproat
  - Surinder Jain
  - Jay Taylor
  - Dale Toukonen
- Collins Career Center  
Great Oaks Institute of Technology  
Sinclair Community College  
Ohio Hi Point Career Center  
Shawnee State University  
Youngstown State University  
Rhodes State College  
Apollo Career Center  
Miami University- Hamilton  
Stark State College  
Sinclair Community College  
Owens Community College  
Auburn Career Center

### Contributors

- Robert Casto
  - Kathy Sommers
- Ohio Board of Regents  
Ohio Department of Education

## Engineering Technology Beta Test Group Panel Members

### Faculty and Teachers

- Dennis Hance
  - Tom Selis
  - Roger Newhouse (Lead and Host)
  - Janna Gallaher
  - Brent Campbell
  - David Barth
  - David Clark
  - Rick Turner
  - Doug Bodey
  - Tonya Budkowski
- Upper Valley JVS  
Rhodes State College  
Rhodes State College  
Shawnee State University  
Wright State University – Lake Campus  
Edison Community College  
Edison Community College  
Apollo Career Center  
Apollo Career Center  
Apollo Career Center