Engineering technology

**ENGINEERING TECHNOLOGY - ENGTC**

Joseph Gorga, Dean  
Physical Sciences and Engineering Division  
Physical Sciences Building, Room 263

**Possible career opportunities**
Career options in engineering technology include civil engineering technicians, surveying and mapping technicians (cartography), architectural and civil drafters, and mechanical engineering technicians. Engineering technicians may work as computer-aided design drafters, engineering aides, land surveyors, field assistants, planning technicians and technical sales people.

**Program-level student learning outcomes**
Program learning outcomes are subject to change. The most current list of program learning outcomes for each program is published on the DVC website at www.dvc.edu/slo.

**Associate in science degree**

**Civil design drafting technology**

Students completing the program will be able to...

A. use technical drafting principles to develop technical drawings.  
B. interpret construction blueprints.  
C. use geometric construction and descriptive geometry to solve geometric problems.  
D. create 2-dimensional and 3-dimensional computer aided drawings (CAD).  
E. interpret global positioning data.  
F. measure land forms using ground surveying equipment.  
G. apply trigonometry to math problems.  
H. apply the basic laws of physics to everyday situations.

The associate in science degree in civil design drafting technology provides students with the technical and analytical skills needed for employment in the field of civil engineering drafting. Through both academic and laboratory study students gain the practical skills needed for entry into the job market. For example, civil drafters may work on plans for major construction projects such as dams, roads, bridges, and sewage systems; or prepare, interpret and revise topographic and/or relief maps using computer-aided-drafting (CAD).

To earn the degree, students must complete each course used to meet a major requirement with a “C” grade or higher and complete general education requirements as listed in the catalog. Students who wish to transfer should consult with program faculty and college counselors to ensure that the requirements for transfer to appropriate institutions are met. Certain courses may satisfy both major and general education requirements; however, the units are only counted once.

**major requirements:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONC-114</td>
<td>Print Reading</td>
<td>3</td>
</tr>
<tr>
<td>ENGIN-121</td>
<td>Engineering Drawing/Descriptive Geometry</td>
<td>3</td>
</tr>
<tr>
<td>PHYS-110</td>
<td>Elementary Physics</td>
<td>3</td>
</tr>
<tr>
<td>plus at least 3 units from:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGT-111</td>
<td>Mathematics for Technicians</td>
<td>3</td>
</tr>
<tr>
<td>MATH-121</td>
<td>Plane Trigonometry</td>
<td>3</td>
</tr>
<tr>
<td>MATH-191</td>
<td>Pre-Calculus</td>
<td>5</td>
</tr>
<tr>
<td>plus at least 3 units from:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCHI-119</td>
<td>Introduction to Technical Drawing</td>
<td>3</td>
</tr>
<tr>
<td>ENGT-119</td>
<td>Introduction to Technical Drawing</td>
<td>3</td>
</tr>
<tr>
<td>plus at least 3 units from:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCHI-126</td>
<td>Computer Aided Design and Drafting - AutoCAD</td>
<td>3</td>
</tr>
<tr>
<td>ENGTC-126</td>
<td>Computer Aided Design and Drafting - AutoCAD</td>
<td>3</td>
</tr>
<tr>
<td>plus at least 3 units from:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGTC-226</td>
<td>Computer Aided Drafting Design, Advanced Concepts - AutoCAD</td>
<td>3</td>
</tr>
<tr>
<td>plus at least 6 units from:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONST-111</td>
<td>Plane Surveying</td>
<td>4</td>
</tr>
<tr>
<td>ENGIN-140</td>
<td>Plane Surveying</td>
<td>4</td>
</tr>
<tr>
<td>ENGTC-123</td>
<td>Principles of Civil Drafting</td>
<td>3</td>
</tr>
<tr>
<td>GEOG-125</td>
<td>Introduction to Geographic Information Systems (GIS)</td>
<td>3</td>
</tr>
<tr>
<td>GEOG-126</td>
<td>Advanced Geographic Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>GEOG-160</td>
<td>Introduction to Remote Sensing</td>
<td>4</td>
</tr>
<tr>
<td>GEOG-162</td>
<td>Map Design and Visualization</td>
<td>3</td>
</tr>
</tbody>
</table>

**total minimum units for the major** 30

**Associate in science degree**

**Machining for mechanical engineering technology**

Students completing the program will be able to...

A. read the drawing for an object and visualize the geometry.  
B. choose the correct manufacturing method for the object.  
C. manufacture an object from a given drawing using machine tools.  
D. use algebra, spreadsheets and measurement data to produce QC statistics.  
E. verify that products meet the design criteria.  
F. design and prototype mechanical parts under the supervision of engineers.  
G. use computer integrated manufacturing (CIM) and computer numerical control (CNC) software for automation of manufacturing.
The associate of science degree in machining for mechanical engineering technology is offered to prepare students with the required aptitude and skills to enter the workforce as entry-level machinists, tool and die makers, or mold makers. Students will be prepared for careers that are highly in demand for aerospace, medical, electronic, high tech, and automotive and transport industries. Graduates of this program will be well equipped to continue their career advancement as engineers, product developers, prototype/model builders, production machinist, or electro-mechanical maintenance and repair specialists.

Students completing this program will develop familiarity with lathes, mills, drill presses, and precision measuring. They will also be introduced to the concepts of computer numerical control (CNC) machines and 3D (additive) manufacturing processes, geometric dimension and tolerance (GD&T), and modern technical drawing (CAD) techniques.

The DVC machining for mechanical engineering technology major is not intended for transfer. Option 1 (DVC General Education) is advised for students who do not intend to transfer. Students who intend to transfer to a four-year baccalaureate program should consult with a counselor regarding specific major preparation requirements at the transfer institution of their choice. Students who intend to transfer are advised to select General Education Option 2 (IGETC) or Option 3 (CSU GE).

Students must complete each of the courses required for the major with a “C” grade or higher. Students may not take a pass/no pass option for major courses. Certain courses may satisfy both major and general education requirements; however, the units are only counted once.

**major requirements:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGT-119</td>
<td>Introduction to Technical Drawing</td>
<td>3</td>
</tr>
<tr>
<td>ENGT-126</td>
<td>Computer Aided Design and Drafting</td>
<td>3</td>
</tr>
<tr>
<td>ENGT-129</td>
<td>Product Design I Using Solidworks</td>
<td>3</td>
</tr>
<tr>
<td>ENGT-160</td>
<td>Introduction to Industrial and Manufacturing Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ENGT-162</td>
<td>Geometric Dimensioning and Tolerancing</td>
<td>1</td>
</tr>
<tr>
<td>ENGT-165</td>
<td>Machining and Manufacturing I</td>
<td>3</td>
</tr>
<tr>
<td>ENGT-166</td>
<td>Machining and Manufacturing II</td>
<td>3</td>
</tr>
<tr>
<td>ENGT-168</td>
<td>Introduction to Computer Numerical Control</td>
<td>3</td>
</tr>
</tbody>
</table>

**plus at least 3 units from:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGT-111</td>
<td>Mathematics for Technicians</td>
<td>3</td>
</tr>
<tr>
<td>MATH-120</td>
<td>Intermediate Algebra</td>
<td>5</td>
</tr>
<tr>
<td>MATH-121</td>
<td>Plane Trigonometry</td>
<td>3</td>
</tr>
<tr>
<td>MATH-191</td>
<td>Pre-Calculus</td>
<td>5</td>
</tr>
<tr>
<td>MATH-192</td>
<td>Analytic Geometry and Calculus I</td>
<td>5</td>
</tr>
</tbody>
</table>

**total minimum units for the major** 25

**Associate in science degree**

**mTECH - Industrial maintenance machinist/mechanic**

Students completing the program will be able to...

A. discuss the role of the industrial maintenance machinist/mechanic in shop and field maintenance safety.
B. interpret blueprints and technical drawings for parts manufacturing and maintenance repair operations.
C. grind high speed steel tool bits for general purpose turning and threading.
D. cut multiple lead and acme threads on a lathe.
E. use the vertical milling machine to drill holes, index, bore hole to a specified diameter and depth, mill surfaces and edges, and use an indicator to reference work.
F. replace a single mechanical seal in a centrifugal pump.
G. align a pump shaft to a motor to a specified tolerance.

This program prepares students for jobs in the manufacturing industry including industrial machinery mechanics, maintenance specialists or technicians, and machinery maintenance workers in industries including chemical, refinery, and public works. These jobs involve repairing, installing, adjusting, or maintaining industrial production and processing machinery or refinery and pipeline distribution systems. The labor market for these high-wage occupations in the Bay Area is strong.

Graduates of this program will gain skills and knowledge in areas that include machining, industrial hydraulics and pneumatics, shop and field maintenance, basic electricity, technical drawing, basic drafting, and applied mathematics. Students are advised to meet with a counselor or program advisor to develop an educational plan that meets their needs.

The DVC mTECH major is not intended for transfer. Option 1 (DVC General Education) is advised for students who do not intend to transfer. Students who intend to transfer to a four-year baccalaureate program should consult with a counselor regarding specific major preparation requirements at the transfer institution of their choice. Students who intend to transfer are advised to select General Education Option 2 (IGETC) or Option 3 (CSU GE).

Students must complete each of the courses required for the major with a “C” grade or higher. Students may not take a pass/no pass option for major courses. Certain courses may satisfy both major and general education requirements; however, the units are only counted once.

**major requirements:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONST-110</td>
<td>Occupational Safety</td>
<td>2</td>
</tr>
<tr>
<td>ELECT-110</td>
<td>Survey of Electricity</td>
<td>2</td>
</tr>
<tr>
<td>ENGT-119</td>
<td>Introduction to Technical Drawing</td>
<td>3</td>
</tr>
<tr>
<td>ENGT-165</td>
<td>Machining and Manufacturing I</td>
<td>3</td>
</tr>
<tr>
<td>ENGT-166</td>
<td>Machining and Manufacturing II</td>
<td>3</td>
</tr>
<tr>
<td>ENGT-175</td>
<td>Hydraulic and Pneumatic Systems and Components</td>
<td>3</td>
</tr>
<tr>
<td>ENGT-176</td>
<td>Mechanical Systems and Components</td>
<td>3</td>
</tr>
</tbody>
</table>
Certificate of achievement
Civil design drafting technology

Students completing the program will be able to...
A. use technical drafting principles to develop technical drawings.
B. interpret construction blueprints.
C. use geometric construction and descriptive geometry to solve geometric problems.
D. create 2-dimensional and 3-dimensional computer aided drawings (CAD).
E. interpret global positioning data.
F. measure land forms using ground surveying equipment.
G. apply trigonometry to math problems.
H. apply the basic laws of physics to everyday situations.

This certificate program prepares students for an entry level job as a civil drafter. Drafters work under the supervision of civil or structural engineers, architects, and/or surveyors as support staff in jobs requiring them to prepare, interpret, and revise technical drawings, or gather and categorize field data. Engineering technicians work as support staff in field, laboratory and/or office environments.

To earn a certificate of achievement, students must complete each of the required courses with a “C” grade or higher. Some courses are not offered every term so please consult with the program director for assistance in scheduling classes.

required courses: units
CONST-114 Print Reading................................................. 3
ENGIN-121* Engineering Drawing /Descriptive Geometry................................................. 3
PHYS-110 Elementary Physics............................................ 3

plus at least 3 units from:
ENGT-111 Mathematics for Technicians................................ 3
MATH-121 Plane Trigonometry............................................ 3
MATH-191 Pre-Calculus...................................................... 5

Certificate of achievement
Civil drafting, CAD

Students completing the program will be able to...
A. apply civil drafting principles to interpret and develop civil engineering maps.
B. interpret construction blueprints.
C. create 2-dimensional and 3-dimensional computer aided drawings (CAD).
D. interpret global positioning data.
E. measure land forms using ground surveying equipment.
F. use general computer software such as Microsoft Word and Excel.
G. apply trigonometry to math problems.

This certificate program prepares students for further study or an entry-level training position in jobs requiring them to prepare and revise technical drawings used in civil engineering and surveying.

To earn a certificate of achievement, students must complete each of the required courses with a “C” grade or higher. Some courses are not offered every term so please consult with the program director for assistance in scheduling classes.

required courses: units
CONST-114 Print Reading................................................. 3
ENGTC-111 Mathematics for Technicians................................ 3
MATH-121* Plane Trigonometry............................................ 3

plus at least 3 units from:
ARCHI-119 Introduction to Technical Drawing....................... 3
ENGT-119 Introduction to Technical Drawing......................... 3

plus at least 3 units from:
ARCHI-126 Computer Aided Design and Drafting - AutoCAD................................................. 3
ENGT-126 Computer Aided Design and Drafting - AutoCAD................................................. 3

DIABLO VALLEY COLLEGE CATALOG 2019-2020
any updates to this document can be found in the addendum at www.dvc.edu/communication/catalog
Certificate of achievement
Machining for mechanical engineering technology

Students completing the program will be able to...
A. read the drawing for an object and visualize the geometry.
B. choose the correct manufacturing method for the object.
C. manufacture an object from a given drawing using machine tools.
D. use algebra, spreadsheets and measurement data to produce QC statistics.
E. verify that products meet the design criteria.
F. design and prototype mechanical parts under the supervision of engineers.
G. use computer integrated manufacturing (CIM) and computer numerical control (CNC) software for automation of manufacturing.

The certificate of achievement in machining for mechanical engineering technology is offered to prepare students with the required aptitude and skills to enter the workforce as entry-level machinists, tool and die makers, or mold makers. Students will be prepared for careers that are highly in demand for aerospace, medical, electronic, high tech, and automotive and transport industries. Graduates of this program will be well equipped to continue their career advancement as engineers, product developers, prototype/model builders, production machinist, or electro-mechanical maintenance and repair specialists.

Students completing this program will develop familiarity with lathes, mills, drill presses, and precision measuring. They will also be introduced to the concepts of computer numerical control (CNC) machines and 3D (additive) manufacturing processes, geometric dimension and tolerance (GD&T), and modern technical drawing (CAD) techniques.

Students must complete each of the courses required for the certificate with a "C" grade or higher. Students may not take a pass/no pass option for required courses.

required courses:  
- ENGTC-119 Introduction to Technical Drawing 3 units
- ENGTC-126 Computer Aided Design and Drafting-AutoCAD 3 units
- ENGTC-129 Product Design I Using Solidworks 3 units
- ENGTC-160 Introduction to Industrial and Manufacturing Engineering 3 units
- ENGTC-162 Geometric Dimensioning and Tolerancing 1 unit
- ENGTC-165 Machining and Manufacturing I 3 units
- ENGTC-166 Machining and Manufacturing II 3 units
- ENGTC-168 Introduction to Computer Numerical Control 3 units

Students must complete each of the courses required for the certificate with a "C" grade or higher. Students may not take a pass/no pass option for required courses.

Certificate of achievement
mTECH - Industrial maintenance machinist/mechanic

Students completing the program will be able to...
A. discuss the role of the industrial maintenance machinist/mechanic in shop and field maintenance safety.
B. interpret blueprints and technical drawings for parts manufacturing and maintenance repair operations.
C. grind high speed steel tool bits for general purpose turning and threading.
D. cut multiple lead and acme threads on a lathe.
E. use the vertical milling machine to drill holes, index, bore hole to a specified diameter and depth, mill surfaces and edges, and use an indicator to reference work.
F. replace a single mechanical seal in a centrifugal pump.
G. align a pump shaft to a motor to a specified tolerance.

This program prepares students for jobs in the manufacturing industry including industrial machinery mechanics, maintenance specialists or technicians, and machinery maintenance workers in industries including chemical, refinery, and public works. These jobs involve repairing, installing, adjusting, or maintaining industrial production and processing machinery or refinery and pipeline distribution systems. The labor market for these high-wage occupations in the Bay Area is strong.

Graduates of this program will gain skills and knowledge in areas that include machining, industrial hydraulics and pneumatics, shop and field maintenance, basic electricity, technical drawing, basic drafting, and applied mathematics. Students are advised to meet with a counselor or program advisor to develop an educational plan that meets their needs.

Students must complete each course used to meet a program requirement with a "C" grade or higher. Students may not take a pass/no pass option for certificate courses.
### Certificate of accomplishment

**Computer aided drafting and digital media for architecture, industrial design and engineering**

Students completing the program will be able to...
- A. develop technical drawings with detailed dimensions using hand drafting line work and lettering.
- B. create 2-dimensional computer aided design (CAD) drawings and 3-dimensional computer models.
- C. safely operate hand and power tools.
- D. use measuring devices to calculate and verify tolerances for metal, wood, and plastics parts.
- E. apply prototyping techniques for engineering, product design, and manufacturing.

The certificate of accomplishment in pre-engineering technology provides students with the foundation of skills required to pursue a degree or certificate in mTECH (industrial machine maintenance), manufacturing, industrial design, or electro-mechanical. The courses provide students with skills in technical drawing, computer aided design (CAD), and traditional shop tools.

Students create detailed product specifications and gain knowledge required to safely operate shop tools. Concepts in technical drawing, computer-aided design, and hand drafting will be inclusive. In addition, students use a variety of measuring devices and safely operate traditional machinery including drills, saws and mechanical tools. Completion of the foundation courses and prepare students to transition into technical design, rapid prototyping, computer numerical control (CNC) machining and manufacturing.

To earn a certificate of accomplishment, students must complete each of the required courses with a “C” grade or higher. Some courses are not offered every term. Consult with the program director for assistance in scheduling classes.

#### Required courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONST-110</td>
<td>Occupational Safety</td>
<td>2</td>
</tr>
<tr>
<td>ELECT-110</td>
<td>Survey of Electricity</td>
<td>2</td>
</tr>
<tr>
<td>ENGTG-119</td>
<td>Introduction to Technical Drawing</td>
<td>3</td>
</tr>
<tr>
<td>ENGTG-165</td>
<td>Machining and Manufacturing I</td>
<td>3</td>
</tr>
<tr>
<td>ENGTG-166</td>
<td>Machining and Manufacturing II</td>
<td>3</td>
</tr>
<tr>
<td>ENGTG-175</td>
<td>Hydraulic and Pneumatic Systems and Components</td>
<td>3</td>
</tr>
<tr>
<td>ENGTG-176</td>
<td>Mechanical Systems and Components</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total minimum required units</strong></td>
<td><strong>19</strong></td>
</tr>
</tbody>
</table>

#### Plus at least 3 units from:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCHI-119</td>
<td>Introduction to Technical Drawing</td>
<td>3</td>
</tr>
<tr>
<td>ARCHI-120</td>
<td>Introduction to Architecture</td>
<td>3</td>
</tr>
<tr>
<td>CONST-114</td>
<td>Print Reading</td>
<td>3</td>
</tr>
<tr>
<td>ENGTG-119</td>
<td>Introduction to Technical Drawing</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Certificate of accomplishment

**Pre-engineering technology**

Students completing the program will be able to...
- A. develop technical drawings with detailed dimensions using hand drafting line work and lettering.
- B. create 2-dimensional computer aided design (CAD) drawings and 3-dimensional computer models.
- C. safely operate hand and power tools.
- D. use measuring devices to calculate and verify tolerances for metal, wood, and plastics parts.
- E. apply prototyping techniques for engineering, product design, and manufacturing.

The certificate of accomplishment in pre-engineering technology provides students with the foundation of skills required to pursue a degree or certificate in mTECH (industrial machine maintenance), manufacturing, industrial design, or electro-mechanical. The courses provide students with skills in technical drawing, computer aided design (CAD), and traditional shop tools.

Students create detailed product specifications and gain knowledge required to safely operate shop tools. Concepts in technical drawing, computer-aided design, and hand drafting will be inclusive. In addition, students use a variety of measuring devices and safely operate traditional machinery including drills, saws and mechanical tools. Completion of the foundation courses and prepare students to transition into technical design, rapid prototyping, computer numerical control (CNC) machining and manufacturing.

To earn a certificate of accomplishment, students must complete each of the required courses with a “C” grade or higher. Some courses are not offered every term. Consult with the program director for assistance in scheduling classes.

#### Required courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCHI-135</td>
<td>Digital Tools for Design</td>
<td>3</td>
</tr>
<tr>
<td>ARCHI-136</td>
<td>Digital Tools for Architecture</td>
<td>3</td>
</tr>
<tr>
<td>ARTDM-160</td>
<td>3D Modeling and Animation I</td>
<td>3</td>
</tr>
<tr>
<td>ENGTC-129</td>
<td>Product Design Using SolidWorks</td>
<td>3</td>
</tr>
<tr>
<td>GEOG-125</td>
<td>Introduction to Geographic Information Systems (GIS)</td>
<td>3</td>
</tr>
<tr>
<td>IDSGN-120</td>
<td>Introduction to Industrial and Product Design</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total minimum required units</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

#### Plus at least 3 units from:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGTG-226</td>
<td>Computer Aided Drafting Design, Advanced Concepts - AutoCAD</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total minimum required units</strong></td>
<td><strong>8</strong></td>
</tr>
</tbody>
</table>
ENGTC-111  Mathematics for Technicians
3 units LR
• 54 hours lecture per term
• Prerequisite: MATH-090 or MATH-090E or MATH-090SP or equivalent
• Formerly ENGIN-111
This course is a study of mathematical topics used for technical applications in the workplace. Topics include an introduction to units of measurement, mathematical operations with application to technical problems, algebraic operations and concepts in geometry and trigonometry. An introduction to coordinate spaces and systems and their application to technical problems in the field are also covered. The calculation of surface areas and volumes are presented in context with problems encountered in technical and design fields. CSU

ENGTC-119  Introduction to Technical Drawing
3 units SC
• 36 hours lecture/72 hours laboratory per term
• Note: Same as ARCHI-119. For students with no previous drafting experience. Credit by examination option available.
• Formerly ENGIN-119
This course presents an introduction to technical drawing. Topics include technical lettering and line work, geometric constructions, sketching and shape description, orthographic projection, dimensioning, section views, and auxiliary views. Students will gain experience using computers to produce technical drawings, utilizing 3D modeling and orthographic computer aided design (CAD) drafting. An introduction to computer numerical control (CNC) prototyping and 3D printing is also covered. CSU, UC (credit limits may apply to UC - see counselor)

ENGTC-123  Principles of Civil Drafting
3 units LR
• 36 hours lecture/72 hours laboratory per term
• Recommended: ENGTC-111 (may be taken concurrently), ENGTC-119 and ENGTC-126 or equivalents
• Formerly ENGIN-123
Introduction to civil drafting as it relates to topographic maps and charts. Course covers reading, interpreting and constructing a variety of maps used for civil engineering such as surveyor maps, plat and plot maps, and aerial maps. Students will use both manual and computer methods for drafting of maps. CSU

ENGTC-126  Computer Aided Design and Drafting - AutoCAD
3 units SC
• 36 hours lecture/72 hours laboratory per term
• Recommended: ENGTC-119 or ARCHI-119 or equivalent
• Note: Same as ARCHI-126. Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree. Credit by examination option available.
• Formerly ENGIN-126
This introductory course covers the fundamentals of AutoCAD, and its application to the creation of technical drawings. Hands-on training utilizing a comprehensive overview of the software package and its applications to technical drafting is emphasized. CSU, UC (credit limits may apply to UC - see counselor)

ENGTC-129  Product Design I Using SolidWorks
3 units SC
• 36 hours lecture/72 hours laboratory per term
• Recommended: ARCHI-119 or ENGT-119 or equivalent
• Note: Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree. Credit by examination option available.
• Formerly ENGIN-129
This course will introduce students to product design using SolidWorks. Students will learn the functions of SolidWorks and how to apply these functions within the product design process. CSU

ENGTC-160  Introduction to Industrial and Manufacturing Engineering
3 units LR
• 54 hours lecture per term
• Formerly ENGIN-160
This course presents the methods and processes involved in the manufacturing of a variety of products in various materials. Topics include an introduction to various materials and their properties, types of machinery used in manufacturing, methods of casting and shaping materials along with other industrial and technical processes. An introductory overview of engineering drawing standards and quality assurance is also covered. CSU, UC

ENGTC-162  Geometric Dimensioning and Tolerancing
1 unit LR
• 9 hours lecture/27 hours laboratory per term
• Recommended: ENGTC-111 or equivalent
• Formerly ENGIN-162
This course will present the principles of geometric dimensioning and tolerancing (GDT). Topics include GDT symbols, datum planes, material conditions, orientation, location, profile and runout tolerances. Laboratory assignments emphasize measurement using granite tables and pin and height gauges. CSU, UC
ENGTC-165  Machining and Manufacturing I
3 units  LR
• 36 hours lecture/72 hours laboratory per term
• Recommended: ENGTC-119 or ARCHI-119 or equivalent
• Formerly ENGIN-165
This course introduces practical and theoretical aspects of machine tool processes. Topics include basic blueprint interpretation, use of hand tools, measuring instruments and gauges, layout, inspection techniques and metals identification. Setup and operation of drill presses, band saw, grinders, lathes, milling machines and related tools will also be covered. CSU

ENGTC-166  Machining and Manufacturing II
3 units  LR
• 36 hours lecture/72 hours laboratory per term
• Prerequisite: ENGTC-165 or equivalent
• Formerly ENGIN-166
This course introduces practical and theoretical aspects of advanced machine tool processes, focusing on lathe and vertical milling machine operations. Topics include precision measuring and inspection practices, surfac grinding, special work holding devices, and mechanical hardware. An introduction to Geometric Dimensioning and Tolerancing (GDT) and properties of materials associated with machinability, heat treating and hardness testing is provided. CSU

ENGTC-168  Introduction to Computer Numerical Control
3 units  SC
• 36 hours lecture/72 hours laboratory per term
• Recommended: ENGIN-120 or equivalent
• Formerly ENGIN-168, ENGIN-172
This course introduces students to Computer Numerical Control (CNC) machining. Students will learn the techniques of developing and programming cutting tool paths and movements using three-dimensional CAD models and working drawings. Instruction will cover the use of Computer Integrated Manufacturing package (CIM) software and visualization of cutting operations. Topics will also include setup and operation of CNC equipment for manufacturing. CSU

ENGTC-175  Hydraulic and Pneumatic Systems and Components
3 units  SC
• 18 hours lecture/108 hours laboratory per term
• Formerly ENGIN-175
This course covers the practical and theoretical aspects of hydraulic and pneumatic systems. Topics include concepts, theory and common systems, components and devices. The laboratory emphasizes hands-on exercises in operation, maintenance and mechanical skills. CSU

ENGTC-176  Mechanical Systems and Components
3 units  SC
• 18 hours lecture/108 hours laboratory per term
• Formerly ENGIN-176
This course covers mechanical systems with an emphasis on mechanical drives, flexible belt drives, lubrication, bearings, vibration, and rotating equipment. Topics include operation, maintenance and repair of mechanical systems and components used in a variety of industrial occupations. CSU

ENGTC-226  Computer Aided Drafting Design, Advanced Concepts - AutoCAD
3 units  SC
• 36 hours lecture/72 hours laboratory per term
• Recommended: ENGTC-126 or ARCHI-126 or equivalent
• Note: Same as ARCHI-226. Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.
• Formerly ENGIN-226
This course covers the concepts and applications of constructing digital three-dimensional (3D) models and photorealistic renderings for presentation using AutoCAD, 3D Studio Max and Alias. Advanced techniques for surface, wireframe and solid modeling will be presented. Students will explore lighting, materials mapping and rendering as they apply to architecture, engineering and industrial design. CSU, UC (credit limits may apply to UC - see counselor).