Computer Aided Drafting and Design

Degrees:
AAS  Computer Aided Drafting and Design  60-63

Diploma:  Computer Aided Drafting and Design  48-51

Certificates:  Computer Assisted Drawer  30-36
Detailer  25-28
Drafter Assistant  13-16
Civil Drafter  27-33

Description:
A computer aided drafter and designer is a technical specialist with broad-based skills for architectural, civil, mechanical, and manufacturing fields. In this program, the students are taught manual drafting techniques and 2D and 3D CAD. Specific skills taught include, but are not limited to, lettering, geometric construction, orthographic projections, dimensioning and tolerancing, and related technical processes. These skills are required to transform specifications and instructions of architects, designers, and engineers into complete and precise drawings. The drafter is a skilled technician with a thorough understanding of the graphic language and is an indispensable contributor to the engineering design team.

Progression in the Computer Aided Drafting and Design program is contingent upon achievement of a grade of “C” or greater in each technical and mathematics course with maintenance of a 2.0 cumulative grade point average or above (on a 4 scale).

Implementation:  Fall 2011

Competencies:
AAS: Computer Aided Drafting and Design
General Education Competencies:
I. Communicate Effectively
   1. Read and listen with comprehension.
   2. Speak and write clearly using standard English.
   3. Interact cooperatively with others using both verbal and non-verbal means.
   4. Demonstrate information processing through basic computer skills.
II. Think Critically
   1. Make connections in learning across the disciplines and draw logical conclusions.
   2. Demonstrate problem solving through interpreting, analyzing, summarizing, and/or integrating a variety of materials.
   3. Use mathematics to organize, analyze, and synthesize data to solve a problem.
III. Learn Independently
   1. Use appropriate search strategies and resources to find, evaluate, and use information.
   2. Make choices based upon awareness of ethics and differing perspectives/ideas.
   3. Apply learning in academic, personal, and public situations.
   4. Think creatively to develop new ideas, processes, or products.
IV. Examine Relationships in Diverse and Complex Environments
   1. Recognize the relationship of the individual to human heritage and culture.
   2. Demonstrate an awareness of the relationship of the individual to the biological and physical environment.
   3. Develop an awareness of self as an individual member of a multicultural global community.

Technical Core Competencies:
Upon completion of this program, the graduate can:
I. Make drawing modifications.
2. Create freehand technical sketches.
3. Create an initial drawing using appropriate drafting standards.
4. Demonstrate the use of Cartesian Coordinate system with CAD software.
5. Create orthographic (multiview) drawings using manual and computer aided drafting techniques.
6. Verify drawing accuracy.
7. Perform geometric constructions.
8. Identify, create, and place appropriate section views (e.g., full, half, offset, removed, aligned).
9. Identify, create, and place appropriate auxiliary views.
10. Identify and create pictorial drawings.
11. Identify and create axonometric, oblique, and perspective drawings.
12. Locate points and lines in space using descriptive geometry techniques.
13. Determine bearings, azimuths, grade, and slope of lines.
15. Create sheet metal drawings using revolution and development theories.
16. Create an assembly drawing from existing part data.
17. Apply dimensions to drawings using various units.
18. Calculate and apply dimension tolerances to drawings.
19. Demonstrate knowledge of geometric dimensioning and tolerancing.
20. Create three-dimensional models from two-dimensional drawings.
21. Use reference books, manufacturer’s manuals, and trade publications for information.
22. Perform basic mathematical concepts.
23. Demonstrate knowledge of geometry.
24. Demonstrate knowledge of trigonometry.
25. Calculate volume, mass, and area.
26. Demonstrate computer knowledge and file management.
27. Operate and adjust input and output devices.
28. Create working drawings.
29. Plot scaled drawings.
30. Participate as a member of a team.

Technical Electives:
The technical elective competencies will vary according to courses completed.

Diploma: Computer Aided Drafting and Design
Upon completion of this program, the graduate can:

Competencies will be met at the level appropriate to the credential.

General Education Competencies:
I. Communicate Effectively
   1. Read and listen with comprehension.
   2. Speak and write clearly using standard English.
   3. Interact cooperatively with others using both verbal and non-verbal means.
   4. Demonstrate information processing through basic computer skills.
II. Think Critically
    1. Make connections in learning across the disciplines and draw logical conclusions.
    2. Demonstrate problem solving through interpreting, analyzing, summarizing, and/or integrating a variety of materials.
    3. Use mathematics to organize, analyze, and synthesize data to solve a problem.
III. Learn Independently
     1. Use appropriate search strategies and resources to find, evaluate, and use information.
     2. Make choices based upon awareness of ethics and differing perspectives/ideas.
     3. Apply learning in academic, personal, and public situations.
     4. Think creatively to develop new ideas, processes, or products.
IV. Examine Relationships in Diverse and Complex Environments
    1. Recognize the relationship of the individual to human heritage and culture.
2. Demonstrate an awareness of the relationship of the individual to the biological and physical environment.
3. Develop an awareness of self as an individual member of a multicultural global community.

Technical Competencies:
1. Make drawing modifications.
2. Create freehand technical sketches.
3. Create an initial drawing using appropriate drafting standards.
4. Demonstrate the use of Cartesian Coordinate system with CAD software.
5. Create orthographic (multiview) drawings using manual and computer aided drafting techniques.
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28. Create working drawings.
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30. Participate as a member of a team.

Technical Electives
The technical elective competencies will vary according to courses completed.

Certificates:
Computer Assisted Drafter
Upon completion of this program, the graduate can:
1. Make drawing modifications.
2. Create freehand technical sketches.
3. Create an initial drawing using appropriate drafting standards.
4. Demonstrate the use of Cartesian Coordinate system with CAD software.
5. Create orthographic (multiview) drawings using manual and computer aided drafting techniques.
6. Perform geometric constructions.
7. Identify, create, and place appropriate section views (e.g., full, half, offset, removed, aligned).
8. Identify, create, and place appropriate auxiliary views.
9. Identify and create pictorial drawings.
10. Identify and create axonometric, oblique, and perspective drawings.
11. Apply dimensions to drawings using various units.
12. Apply dimensions to drawings using various units.
13. Perform basic mathematical operations.
14. Demonstrate knowledge of geometry.
15. Demonstrate knowledge of trigonometry.
17. Demonstrate computer knowledge and file management.
18. Operate and adjust input and output devices.
19. Create working drawings.
20. Plot scaled drawings.
21. Participate as a member of a team.

**Detailer**
Upon completion of this program, the graduate can:
1. Make drawing modifications.
2. Demonstrate the use of Cartesian Coordinate system with CAD software.
3. Create orthographic (multiview) drawings using manual and computer aided drafting techniques.
4. Perform geometric constructions.
5. Apply dimensions to drawings using various units.
6. Make plots and copies of scaled drawings.
7. Perform basic mathematical operations.
8. Demonstrate computer knowledge and file management.
9. Operate and adjust input and output devices.

**Drafter Assistant**
Upon completion of this program, the graduate can:
1. Make drawing modifications.
2. Create orthographic (multiview) drawings.
3. Perform geometric constructions.
4. Apply dimensions to drawings using various units.
5. Make plots and copies of scaled drawings.
6. Perform basic mathematical operations.
7. Demonstrate computer knowledge and file management.
8. Operate and adjust input and output devices.

**Civil Drafter**
Upon completion of this program, the graduate can:
1. Make drawing modifications.
2. Create orthographic (multiview) drawings.
3. Perform geometric constructions.
4. Apply dimensions to drawings using various units.
5. Make plots and copies of scaled drawings.
6. Perform basic mathematical operations.
7. Demonstrate computer knowledge and file management.
8. Operate and adjust input and output devices.
9. Apply drafting techniques to surveying drawings using manual and computer aided drafting.
10. Define the terms associated with surveying.
11. Identify the equipment used in surveying.

**Outlines:**

**AAS**
**Computer Aided Drafting and Design**

**General Education:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ENG 101</td>
<td>Writing I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Quantitative Reasoning (MAT 105 excluded)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Natural Sciences</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Social/Behavioral Sciences</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Heritage/Humanities</td>
<td>3</td>
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<td></td>
<td>Oral Communications</td>
<td>3</td>
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</tbody>
</table>
General Education Titles and Requirements Updated October 2011

**Subtotal** | 18

**Technical Core:**  
Computer /Digital Literacy course OR  
Demonstrated competency | 0-3

<table>
<thead>
<tr>
<th>Course</th>
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<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD 100</td>
<td>Introduction to Computer Aided Design</td>
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</tr>
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<tr>
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<td>4</td>
</tr>
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<td>Intermediate Computer Aided Design</td>
<td>4</td>
</tr>
<tr>
<td>CAD 201</td>
<td>Parametric Modeling</td>
<td>4</td>
</tr>
</tbody>
</table>

**Subtotal** | 23-26

**NOTE:** Computer Literacy must be demonstrated either by competency exam or by completing a computer literacy course.

**Technical Electives:**  
Choose 19 credits from the technical electives list. | 19

| Subtotal | 19 |

**Total Credits** | 60-63

**Technical Electives:** (This list is not all inclusive, other courses may be taken as approved by the program coordinator such as courses with prefix ACH, BRX, CAR, SMT, and PLW.)  

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>CAD 108</td>
<td>Introduction to Surveying</td>
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</tr>
<tr>
<td>CAD 120</td>
<td>Introduction to Architecture</td>
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</tr>
<tr>
<td>CAD 150</td>
<td>Programming in CAD</td>
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</tr>
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<td>Industrial Drafting Processes</td>
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<td>Mechanical Design</td>
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<td>Architectural Design</td>
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</tr>
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<td>CAD 230</td>
<td>Construction Techniques</td>
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</tr>
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<td>Advanced Dimensioning and Measurement</td>
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</tr>
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<td>Commercial Detailing</td>
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</tr>
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<td>CAD 262</td>
<td>Working Drawings</td>
<td>4</td>
</tr>
<tr>
<td>CAD 292</td>
<td>Industrial Applications</td>
<td>4</td>
</tr>
<tr>
<td>CAD 293</td>
<td>Special Problems</td>
<td>1-4</td>
</tr>
<tr>
<td>CAD 298</td>
<td>Practicum</td>
<td>1-3</td>
</tr>
<tr>
<td>CAD 299</td>
<td>Cooperative Experience</td>
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**Diploma**  
**Computer Aided Drafting and Design**

**General Education:**  
**Area 1:** Written Communication, Oral Communications, or Humanities/Heritage | 3

**Area 2:** Quantitative Reasoning (MAT 105 excluded) | 3

**Subtotal** | 6

**Technical Core:**  
Computer/Digital Literacy course or  
Demonstrated competency | 0-3

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**Subtotal** | 23-26
NOTE: Computer/Digital Literacy must be demonstrated either by competency exam or by completing a computer/digital literacy course.

Technical Electives:
Choose 19 credits from the technical electives list.  19

**Subtotal**  19  
**Total Credits**  48-51

Technical Electives: (This list is not all inclusive, other courses may be taken as approved by the program coordinator such as courses with prefix ACH, BRX, CAR, SMT, and PLW.)

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Certificate
**Computer Assisted Drafter**

General Education:
Written Communication, Oral Communications, or Humanities/Heritage  3
Quantitative (MAT 105 excluded)  3

**Subtotal**  6  

Technical Core:
Computer/Digital Literacy course or Demonstrated competency  0-3

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**Subtotal**  24-30  
**Total Credits**  30-36

NOTE: Computer/Digital Literacy must be demonstrated either by competency exam or by completing a computer/digital literacy course.
### Certificate
#### Civil Drafter

**General Education:**

Quantitative Reasoning (MAT 105 excluded) 3

Subtotal 3

**Technical Core:**

Computer/Digital Literacy or
Demonsrated competency 0-3

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Subtotal 15-18

**Surveying Core:**

Choose 9-12 hours from the following courses:

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<tr>
<td>CAD 108</td>
<td>Introduction to Surveying</td>
<td>3</td>
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<tr>
<td>SMT 110</td>
<td>Principles of Surveying</td>
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<td>SMT 130</td>
<td>Land Surveying Graphics</td>
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<td>SMT 160</td>
<td>Construction Surveying</td>
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<tr>
<td>SMT 210</td>
<td>Advanced Surveying Measurement</td>
<td>3</td>
</tr>
<tr>
<td>SMT 220</td>
<td>Surveying Lab</td>
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</tr>
<tr>
<td>SMT 230</td>
<td>Land Boundary Location</td>
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</tr>
<tr>
<td>SMT 250</td>
<td>Mine Surveying</td>
<td>3</td>
</tr>
</tbody>
</table>

Subtotal 9-12

**Total Credits** 27-33

### Certificate
#### Detailer

**General Education:**

Written Communication, Oral Communications, or
Humanities/Heritage 3

Quantitative Reasoning (MAT 105 excluded) 3

Subtotal 6

**Technical Core:**

Computer/Digital Literacy course OR
Demonsrated competency 0-3

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Subtotal 19-22

**Total Credits** 25-28
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<td>Written Communication, Oral Communications, or Humanities/Heritage</td>
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**Dates of Actions:**
**Approved:**
**Revised:** May 2004, December 2006, February 2011