Computer Aided Drafting for Architecture

PEIMS Code: N1300429
Abbreviation: CAD4ARCH
Grade Level(s): 10–12
Award of Credit: 1.0

Approved Innovative Course

- Districts must have local board approval to implement innovative courses.
- In accordance with Texas Administrative Code (TAC) §74.27, school districts must provide instruction in all essential knowledge and skills identified in this innovative course.
- Innovative courses may only satisfy elective credit toward graduation requirements.
- Please refer to TAC §74.13 for guidance on endorsements.

Course Description:

*Computer Aided Drafting for Architecture* introduces students to the specific architectural computer aided design and drafting (CADD) software and equipment required to produce architectural working drawings and construction documents.

Essential Knowledge and Skills:

(a) General Requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Architectural Design. Students shall be awarded one credit for successful completion of this course.

(b) Introduction.

1. Career and technical education instruction provide content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current emerging professions.

2. The Architecture and Construction Career Cluster focuses on designing, planning, managing, building, and maintaining the built environment.

3. Computer-Aided Drafting for Architecture allows students to acquire knowledge and skills needed to use specific architectural design software and equipment required to produce architectural working drawings and construction documents.

4. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

5. Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.
(c) **Knowledge and Skills.**

1. The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:
   
   (A) describe the roles, responsibilities, and dynamics of a team as applied in the architecture and construction industry;

   (B) explain employers’ work expectations;

   (C) use effective and accurate architectural and/or construction vocabulary throughout the design and drafting process;

   (D) demonstrate knowledge of the concepts and skills related to health and safety; and

   (E) demonstrate safety in the workplace as specified by appropriate governmental regulations.

2. The student demonstrates knowledge of the function and application of tools, libraries, and materials used in architectural CADD software. The student is expected to:

   (A) describe architectural computer-aided design, drafting, and architectural CADD applications;

   (B) describe the purpose of Building Information Management (BIM) and how it is applied in the software;

   (C) demonstrate how to start and exit architectural CADD software without corrupting files;

   (D) select and use architectural project template files;

   (E) save, close, and open project files;

   (F) navigate and use the architectural CADD interface and manipulate the workspace, tools and libraries;

   (G) demonstrate how to use the property palette, project browser, and view control bar;

   (H) determine, specify, and set-up project drawing units, unit precision, and limits;

   (I) use drawing snap and grid functions;

   (J) use and determine what level of detail is required, and scale per plan;

   (K) use the context menu, navigation bar, and viewing command to perform zooming and panning;

   (L) use the various window options to open, close, and display multiple views in the drawing window;

   (M) demonstrate the use of dynamic input and the command line; and

   (N) demonstrate the use of the Quick Access Tool Bar to access frequently used CADD tools.

3. The student demonstrates the use of architectural CADD tools for drawing and editing an architectural model. The student is expected to:

   (A) draw a structure; select exterior and interior wall types;
(B) use the options bar and properties pallet to specify wall details;
(C) add room separation lines;
(D) use the various modify tools to edit: trim, extend, mirror, split, align, move, array, scale, offset, array, rotate, copy, scale, and pin;
(E) edit wall profiles, create openings, attach and detach walls, and join walls;
(F) demonstrate how to shade, crop, hide, unhide, isolate, and un-isolate elements and categories on current views;
(G) insert doors and windows, select type and size from family options, or load from libraries;
(H) add component’s features such as furniture and equipment, and load from libraries;
(I) create curtain walls, including the addition of mullions and panels;
(J) insert curtain walls doors;
(K) select and draw floor types, including slope, sink, and elevated floors;
(L) select a ceiling type and create a ceiling;
(M) design and draw a roof, including the addition of slopes and overhangs;
(N) select, load, and modify columns;
(O) design, draw, and edit stairs, railing, and ramps; and
(P) draw architectural details, including: 2D objects, detail lines, regions, groups, symbols, and drafting views.

(4) The student demonstrates the use of annotation and dimension standards and practices. The student is expected to:

(A) use proper text and dimension standards and rules for architectural drawings;
(B) select and apply text and dimension styles and size to enhance readability of drawings;
(C) demonstrate how to use aligned, linear, angular, radial, and diameter dimensioning, and set constraints;
(D) demonstrate how to place spot elevation, spot coordinate and spot slope annotations;
(E) add and edit tags;
(F) create and modify schedules and legends; and
(G) annotate details, add detail tags, and create filled regions.

(5) The student demonstrates the use of architectural CADD view tools to create plans, elevations, sections and 3-dimensional views. The student is expected to:

(A) create floor plans, reflected ceiling plans, and various views, including structural, plan region, and area plan views;
(B) create exterior and interior elevations;
(C) create building-cross section views, wall section, and detail section views;
(D) edit and specify elevation, section, and call-out tags and line-of-sight locations; and
(E) modify, add, and delete elevation levels.

(6) The student demonstrates the use of architectural CADD tools for printing and plotting drawings. The student is expected to:

(A) set up sheet size, and title blocks following architectural standard practices;
(B) name and edit sheet labels;
(C) select proper drawing scales for viewports, arrange viewports on sheets;
(D) add schedules, legends, and notes on sheets;
(E) select printer and setup print settings, including range, paper size, orientation, scale, placement, appearance, and other printer specific options; and
(F) print or plot architectural working drawings and construction documents at various scales.

Recommended Resources and Materials:
SDC Publications Retrieved from www.sdcpublications.com

Recommended Course Activities:
- Transfer a single-story residential sketch to the architectural CADD system producing the related working drawings and construction documents.
- Convert/design a double-car carport into a master bedroom suite using the architectural CADD software producing the related working drawings and construction documents.
- Convert/design a double-car garage into a family room using the architectural CADD software producing the related working drawings and construction documents.
- Design a small studio apartment on the architectural CADD software producing the related working drawings and construction documents.
- Design a single-story residence on the architectural CADD software producing the related working drawings and construction documents.

Suggested methods for evaluating student outcomes:
Performance on assigned projects and teacher developed assessments will be used to determine the student's success. Students will be evaluated on skill competency, written tests, daily grades and group/individual projects using checklists and rubrics.
Teacher qualifications:

An assignment for Computer Aided Drafting for Architecture is allowed with one of the following certificates.

- Mathematics/Physical Science/Engineering: Grades 6-12
- Mathematics/Physical Science/Engineering: Grades 8-12
- Secondary Industrial Arts: Grades 6-12
- Secondary Industrial Technology: Grades 6-12
- Trade and Industrial Education: Grades 6-12 – This assignment requires appropriate work approval.
- Trade and Industrial Education: Grades 8-12 – This assignment requires appropriate work approval.
- Vocational Trades and Industry – This assignment requires appropriate work approval.
- Any home economics or homemaking certificate
- Family and Consumer Sciences, Composite: Grades 6-12

Additional information: