



Approved Innovative Course

- *Districts must have local board approval to implement innovative courses*
- *Innovative courses may meet state elective credit only*
- *CTE Innovative courses may not be the final course in a coherent sequence for an endorsement*
- *Course requirements must be met without modification*

Course: Introduction to Computer Aided Design and Drafting
PEIMS Code: N1303769
Abbreviation: INTRCADD
Grade Level(s): 9-12
Number of Credits: 1.0

Course description:

Introduction to Computer-Aided Design and Drafting (CADD), introduces students to CADD equipment, software selection and interfaces; setting up a CADD workstation; upgrading a computer to run advanced CADD software; storage devices; storing, retrieving, back-up and sharing databases; file servers and local area networks (LANs); and transferring drawing files over the Internet.

Essential knowledge and skills:

- (a) General requirements. This course is recommended for students in Grades 10-12. Prerequisite: Architectural Design. Students shall be awarded one credit for successful completion of this course.
- (b) Introduction.
 - (1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
 - (2) The Manufacturing Career Cluster focuses on planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and manufacturing/process engineering.
 - (3) Introduction to computer-aided design and drafting (CADD) allows students to acquire knowledge and skills needed to use architectural design software including an introduction to CADD equipment and software selection and interfaces. Students will gain skills in setting up a CADD workstation; upgrading a computer to run advanced CADD software; working with storage devices; storing, retrieving, backing-up and sharing databases; file servers and local area networks (LANs); and transferring drawing files over the Internet.



Approved Innovative Course

- *Districts must have local board approval to implement innovative courses*
- *Innovative courses may meet state elective credit only*
- *CTE Innovative courses may not be the final course in a coherent sequence for an endorsement*
- *Course requirements must be met without modification*

- (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 manufacturing industry;
 - (B) explain employers' work expectations;
 - (C) use effective and accurate architectural and/or engineering vocabulary throughout design and drafting process;
 - (D) demonstrate knowledge of the concepts and skills related to health; and
 - (E) demonstrate safety in the workplace as specified by appropriate governmental regulations.
 - (2) The student demonstrates knowledge of the CADD software. The student is expected to:
 - (A) describe computer-aided design, drafting, and CADD applications;
 - (B) demonstrate how to start and exit CADD software without corrupting files;
 - (C) use draw files;
 - (D) save, close, and open saved files;
 - (E) determine and specify drawing units and limits;
 - (F) describe and use the Cartesian coordinate system;
 - (G) use drawing snap and grid functions; and
 - (H) demonstrate the use of dynamic input and the command line.
 - (3) The student demonstrates the use of CADD tools for basic drawing and plotting. The student is expected to:
 - (A) draw objects using the line tool;
 - (B) draw circles, arcs, ellipses, and elliptical arcs;



Approved Innovative Course

- *Districts must have local board approval to implement innovative courses*
- *Innovative courses may meet state elective credit only*
- *CTE Innovative courses may not be the final course in a coherent sequence for an endorsement*
- *Course requirements must be met without modification*

- (C) draw polylines, rectangles, donuts, and filled circles;
 - (D) draw true spline curves;
 - (E) create drawing templates;
 - (F) describe basic line conventions;
 - (G) create and manage layers;
 - (H) draw objects on separate layers;
 - (I) print and plot drawings;
 - (J) demonstrate organizational skills to influence the sequential process when creating drawings;
 - (K) construct geometric figures of lines, splines, circles, and arcs;
 - (L) create and edit text using appropriate style and size to annotate drawings;
 - (M) use control accuracy enhancement tools for entity positioning methods such as snap and xyz;
 - (N) use editing commands;
 - (O) use viewing commands to perform zooming and panning;
 - (P) plot drawings on media using layout and scale;
 - (Q) use query commands to interrogate database for entity characteristics, distance, area, and status;
 - (R) move, stretch, and offset objects;
 - (S) create a radius between objects;
 - (T) trim and extend objects;
 - (U) break and join objects; and
 - (V) change object properties.
- (4) The student demonstrates the use of CADD tools display and viewpoints. The student is expected to:
- (A) create multiple viewpoints in the drawing window;
 - (B) select appropriate object snaps for various drawing tasks;
 - (C) create orthographic drawings;
 - (D) analyze challenges and identify solutions for design problems;



Approved Innovative Course

- *Districts must have local board approval to implement innovative courses*
- *Innovative courses may meet state elective credit only*
- *CTE Innovative courses may not be the final course in a coherent sequence for an endorsement*
- *Course requirements must be met without modification*

- (E) investigate the use of space, scale, and environmental features to create three-dimensional form or the illusion of depth and form;
 - (F) prepare multi-view scaled drawings;
 - (G) select proper drawing scale, views, and layout;
 - (H) create drawings containing horizontal and vertical surfaces;
 - (I) create drawings containing circles and arcs;
 - (J) create removed details and conventional breaks using sectional drawing techniques;
 - (K) create assembly drawings;
 - (L) create detail drawings; and
 - (M) create technical drawings.
- (5) The student demonstrates the use of CAD software tools to properly create text within a CADD drawing. The student is expected to:
- (A) use proper text standards for technical drawings;
 - (B) calculate drawing scale and text height using a scale ratio;
 - (C) apply text styles to enhance readability of drawings;
 - (D) demonstrate the use of tools to create multiline text objects and single-line text;
 - (E) edit existing text; and
 - (F) create, insert, and modify tables.
- (6) The student demonstrates the use of CADD editing tools within drawings. The student is expected to:
- (A) draw chamfers and fillets;
 - (B) use editing tools to modify existing drawings;
 - (C) edit polylines and splines;
 - (D) move and copy objects;
 - (E) create mirror images and align objects; and
 - (F) scale and array objects.
- (7) The student demonstrates the use of grips in drawings. The student is expected to:
- (A) apply grips to stretch, move, rotate, scale, mirror, and copy objects;



Approved Innovative Course

- *Districts must have local board approval to implement innovative courses*
- *Innovative courses may meet state elective credit only*
- *CTE Innovative courses may not be the final course in a coherent sequence for an endorsement*
- *Course requirements must be met without modification*

- (B) demonstrate the use of Quick Properties and the Properties palette to access CADD tools; and
 - (C) create selections by using the Quick Select dialog box.
- (8) The student demonstrates the use of scale and dimension standards and practices. The student is expected to:
- (A) apply standard dimensioning rules;
 - (B) draw scales and dimensions;
 - (C) create, edit, and manage dimension styles;
 - (D) add linear and angular dimensions to a drawing;
 - (E) draw datum and chain dimensions;
 - (F) dimension circles and arcs;
 - (G) control the appearance of existing dimensions and dimension text; and
 - (H) change dimension line spacing and alignment.
- (9) The student creates and demonstrates standard blocks using tool palettes. The student is expected to:
- (A) create and save text information blocks;
 - (B) insert blocks into a drawing;
 - (C) edit and update a block in a drawing;
 - (D) create blocks as a drawing file;
 - (E) construct and use a symbol library of blocks; and
 - (F) purge unused items from a drawing.
- (10) The student prepares surface developments. The student is expected to:
- (A) prepare developments of prisms, cylinders, cones, and pyramids;
 - (B) prepare developments of a transition piece; and
 - (C) prepare drawings involving intersecting pieces.
- (11) The student designs and prepares basic architectural drawings. The student is expected to:
- (A) solve design problems, to gain new perspectives;
 - (B) apply critical-thinking and problem-solving skills to develop creative solutions for design problems;



Approved Innovative Course

- Districts must have local board approval to implement innovative courses
- Innovative courses may meet state elective credit only
- CTE Innovative courses may not be the final course in a coherent sequence for an endorsement
- Course requirements must be met without modification

- (C) draw a site plan;
- (D) draw a floor plan;
- (E) draw interior and exterior elevations;
- (F) draw a roof plan;
- (G) prepare door and window schedules;
- (H) draw wall sections;
- (I) draw a plot plan; and
- (J) draw a electrical plan.

Description of specific student needs this course is designed to meet:

Introduction to computer-aided design and drafting (CADD) allows students to acquire knowledge and skills needed to use architectural design software including an introduction to CADD equipment and software selection and interfaces. Students will gain skills in setting up a CADD workstation; upgrading a computer to run advanced CADD software; working with storage devices; storing, retrieving, backing-up and sharing databases; file servers and local area networks (LANs); and transferring drawing files over the Internet.

This course along with other courses in the series of courses will assist student to:

- Enter the job market with a work-ready skill upon completion of high school.
- Receive corporate mentorship and intern/externship opportunities.

Major resources and materials:

Morley, D. & Parker, C.S. (2017) *Understanding Computers: Today and Tomorrow*. Boston, MA: Cengage Learning

Autodesk Building Design Suite 2017 [computer software]. (2016). Retrieved from www.autodesk.com



Approved Innovative Course

- *Districts must have local board approval to implement innovative courses*
- *Innovative courses may meet state elective credit only*
- *CTE Innovative courses may not be the final course in a coherent sequence for an endorsement*
- *Course requirements must be met without modification*

Solidworks Premium 2017 [computer software]. (2016).

Recommended course activities:

Create 2D drawings using design software.
Construct, annotate and plot comprehensive drawings

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 rubrics.

Teacher qualifications:

- Secondary Industrial Arts (Grades 6-12).
- Secondary Industrial Technology (Grades 6-12).
- Technology Education: 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.

Additional information: