Civil Drafting Technology – The Theory and Practice of Civil Engineering and Survey Drafting and Mapping

CEST 51, Section 1239 – Fall 2024 Course Syllabus

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Course Goals

The primary goal of this class is to introduce students to basic manual drafting and sketching, computer-aided drafting and design (CADD), and the production of civil engineering, surveying, and land development plans, plats, maps and drawings utilizing AutoCAD Civil 3D 2025 software. Topics include linework, lettering skills, geometric constructions, drawing perspectives and types, software organization, commands and tools, symbols, dimensioning, annotation, mapping scales, and output types all in the context of civil engineering and surveying project deliverables.

As a class, students will be exposed to the concepts identified in the "Topics and Scope" area below. Upon completion of the course, students are not expected to be civil drafting experts, but they will have acquired a basic understanding of manual (hand) drafting, 2D AutoCAD, and the theory of Civil Drafting. This course is intended to establish a foundation that students can use to broaden their knowledge and better prepare themselves for CEST85 – Computer-Aided Drafting for Civil, Surveying, and Land Development using AutoCAD Civil 3D 2025.

Topics and Scope

PART 1: Introduction to Basic Manual Drafting (4 weeks)

- Multiview drawing
- Isometric drawing
- Projection planes
- Linetypes and lineweights
- Hidden features and centerlines
- Geometric shapes
- Technical hand lettering
- Traditional drafting tools and techniques
- Dimensioning conventions

PART 2: Introduction to AutoCAD 2025 (~5 weeks)

- CAD drawing environment and drawing tools
- Geometric construction and positioning tools
- Geometric constructions
- Multi-view drawings
- Blocks
- Plotting

PART 3: Introduction to Civil Drafting Theory and the Civil 3D 2025 software (~7 weeks)

- Graphical representation in civil engineering, surveying, and land development projects
- Types of maps and drawings
- Surveying measurements in civil drafting
- Contour lines
- Profiles and cross-sections
- Roadway layout
- Tangent curve geometry
- Horizontal curve types - simple, compound, and reverse
- Vertical curve types - sag and crest
- Layout and stationing
- Earthwork
- Cross-sections
- Volume calculations
- Legal descriptions and plats
- Plotting legal descriptions and plats

Student Learning Outcomes

At the conclusion of this course, the student should be able to:

- Apply manual drafting concepts and skills to create 2D construction drawings for the 3D environment.
- Produce CADD projects that employ geometric construction/editing, orthographic projection, layering, dimensioning, and text annotation utilizing the AutoCAD software.
- Prepare basic civil engineering drawings and maps utilizing the AutoCAD Civil 3D software.
- Prepare and interpret basic plats, maps and legal descriptions of properties.

Course Objectives

At the conclusion of this course, the student should be able to:

- Properly select and utilize drafting equipment in the production of manual drafting projects.
- Produce consistent linework and legible lettering in manual drafting projects.
- Graphically execute geometric constructions in assigned manual drafting projects.
- Develop orthographic and isometric drawings in completing manual drafting projects.
- Utilize dimensioning conventions appropriately in a manual drafting project.
- Demonstrate knowledge of AutoCAD file management, commands, and drawing environments.
- Generate and edit geometric constructions, projections, dimensioning, and text annotations.
- Demonstrate proficiency using AutoCAD blocks.
- Demonstrate proficiency creating/managing layers and line types.
- Effectively control printing/plotting of AutoCAD drawing files.

- Implement theory of graphical representation in the production of drawings, maps, and plats used in civil, surveying, and land development.
- Identify the types of drawings, maps, and plats used in civil, surveying, and land development.
- Summarize and identify the proper scales, symbols, and conventions for the types of drawings, maps, and plats used in civil, surveying, and land development.

Recommended Course Preparation

- Completion or concurrent enrollment in SURV 60 (Introduction to Plane Surveying)
- High school geometry

Course Expectations

CEST 51 is the first of two Civil Drafting/CADD-based courses. This course will be relatively fast paced due to the number of topics that will be covered. CEST 51 is designed to provide the fundamentals of manual drafting, 2D AutoCAD, Civil and Survey data management, basic project development, and basic map production skills. In CEST 51, students will develop the most basic civil drafting skills in order to prepare students for CEST 85 and to become entry-level Civil and Survey Technicians upon completion of the certificate requirements. A serious student attitude is strongly encouraged, and a team learning approach underpins the course culture. A team learning approach is one where a student takes an equal (or better) measure of responsibility for their learning experience through their participation, performance, and professional attitude.

Course Schedule

- 8/23/24-9/13/24: Fridays from 12:00 PM to 5:00 PM, *via online "Zoom"*

  invitation.

- 9/20/24-12/13/24: Fridays from 12:00 PM to 5:00 PM,

  Room 196 in Lindley Center for STEM Education on Santa Rosa campus

- Mandatory In-Class Final Exam Date: Friday, 12/20.

  Tentative time of exam: 10:00 AM to 12:45 PM.

Required Reading Materials

- Beginning AutoCAD 2025 Exercise Workbook, by Cheryl R. Shrock and Steve Heather. Earlier versions are also acceptable.
- Civil Drafting Technology, 8th Edition, by David P. Madsen, Terence Shumaker, and David A. Madsen (You MUST have this book by no later than 10/09/24)

- Autodesk Civil 3D 2025 Fundamentals, by Ascent (You MUST have this book by no later than 10/09/24)

Other Materials (required on the first day of class)

- Loaner drafting kit (please check your email for pickup times)

Class Preparation and Attendance

- Attendance is required for both lab and lecture hours. **Except for online quizzes and exams, having your video turned on is not mandatory, however, please turn your video on when asking or answering a question.** Attendance will be taken TWICE during each Zoom and classroom session. If your video is turned off and you do not promptly respond after your name is called, you will be "kicked out" of the Zoom session and placed back in the waiting room. Your lack of attendance can and will affect your grade for this course. Attendance is considered a part of the "class participation" portion of your grade (9%). Class generally begins on the hour and ends ten (10) minutes before the scheduled end of class.
- It is good practice to notify your instructor **by email** if you are going to be late or absent. An excused absence may be granted by contacting the instructor ***sufficiently prior*** to the start of class.
- Students are responsible for all material discussed in the lecture and lab as well as the readings and assignments. Taking notes is good practice and strongly recommended.
- Students are responsible for correctly obtaining any missed lecture or laboratory course information from their fellow classmates and/or Canvas account. Your class participation can and will affect your final grade, as will your class conduct.
- Make-up exams and/or quizzes will not be granted due to an unexcused absence - no exceptions. Under certain circumstances, late assignments may be accepted but will be discounted starting at 20% off the total point value, depending on how many classes have passed since the due date. Such instances will be solely at the instructor's discretion.
- Excessive unexcused absences will not be tolerated. Per SRJC's policy, if a student misses over 10% of total class hours (whether "excused" by the instructor or not), the student may be dropped from the course at the instructor's discretion. *10% of total class hours is only 8 hours!*

Assignments and Homework (this is tentative)

- Weeks 1 thru 4: Read instructor-provided material, and watch instructional videos as assigned. The videos are optional but extremely helpful.
- Weeks 5 thru 9: Read approx. 5-6 chapters ("Lessons") from the Beginning AutoCAD Exercise Workbook per week, and watch instructional videos as assigned by the instructor. Again, the videos are optional but extremely helpful.
- Weeks 9 thru 17: Read approx. 2 chapters from the Civil Drafting Technology, 8th Edition textbook and assigned pages from Autodesk Civil 3D 2025 Fundamentals.
- Homework/chapter review problems assigned from textbook or instructor handouts. The number of assigned problems will vary, depending on the topic.
- Weekly lab assignments using manual drafting, sketching, and/or CAD.
- 8-10 announced quizzes over the course of the semester.
- "Take-home" Midterm examination on Part 2 of the course.
- "Written" and CAD-based final exam on Part 3 of the course.

- All assignments are to be completed as instructed and are to be submitted as PDFs and .dwg files, via Canvas at the beginning of class on the assigned due date, unless otherwise instructed. Late assignments will only be accepted at the instructor's discretion. A penalty of 20% will be deducted from the grade of the late assignment. *Assignments that are more than 2 weeks late will not be accepted, unless due to an excused absence.*
- All assignments are to include your name, assignment number or title, and due date unless otherwise instructed.
- With the exception of manual drafting/sketching assignments, ALL written assignments are to be word processed and single-spaced paragraphs. Please answer questions using complete sentences and/or include the question along with your answer. Failure to follow these instructions may result in no credit.

Quizzes and Exams

- Quizzes and exams will be given on specific areas covered throughout the semester. Sufficient notice will be given prior to the scheduled exam. Brief reviews will be conducted during the previous class lecture.
- **Except when due to extenuating circumstances, NO MAKE-UP QUIZZES OR EXAMS WILL BE GIVEN.**

Tentative Course Schedule

- A tentative course schedule will be posted on Canvas prior to the first day of class. The objective of the schedule is to assist you in planning your coursework. Every effort will be made to stay on schedule. However, the instructor may find it necessary to make appropriate adjustments to meet the learning objectives for the entire class. If/when the schedule requires changes, you will receive a revised schedule with the changes noted in red.

Grading

- Your grade will be based on the total number of points you accumulate with respect to the "top score" total number of points. The sum of the points in each category is multiplied by the following percentages and then added together to determine the total points accumulated:

HOMEWORK = 15%

LAB ASSIGNMENTS = 33%

QUIZZES = 18%

MIDTERM & FINAL EXAM = 25%

+ CLASS PARTICIPATION/SUBJECTIVE GRADING = 9%

Total Accumulated Points

*****Please note that the instructor DOES NOT grade on a curve******

Lab assignments are typically worth 25 points each, but can also vary. Homework points will also vary. Exams and class projects are worth 100-150 points, and quiz points will vary. The final exam is worth 250 points (150 points for the written portion and 100 points for the CAD portion). Final grades are calculated as noted above and are based on the following percentages of the total points accumulated by the top score in each category.

A = 90%-100%

B = 80%-89%

C = 70%-79%

D = 60%-69%

F = Below 60%

Instructor's grading Disclaimer: *This is a very full class! Because of this, not every assignment will be graded. Instead, assignments that are to be graded will be randomly selected each week. Whichever assignment is chosen, it will be the same assignment for every student. If you happen to skip a particular written and/or CAD assignment, and if that skipped assignment is one of the assignments chosen for grading, that skip will result in zero points. Your instructors HIGHLY recommend that you complete ALL assignments. If you want to become a successful civil or surveying technician, you MUST be proficient in CAD. The only way to become proficient at AutoCAD & Civil 3D is to practice, practice, practice (and take* ***CEST85*** *in the Spring – it is equally important for Surveying students as it is for Civil Engineering students)*

Communications

- If you need to get in touch with the instructor, please do so via Canvas messaging or email.

Office Hours

- Office hours are TBD.

Class Preparation

Please be advised that MS Windows-based PC workstations are the industry standard for Autodesk products running in the civil engineering and land surveying industry. Students may use their own Windows OS-based computer and/or utilize SRJC's Virtual Lab (recommended). If using a Mac OS (with or without emulators or boot partitions) or if the minimum home system requirements for running Civil 3D 2025 are not met or exceeded, students are directed to the SRJC computer lab in L196 (in person or remote). **Note:** Your instructor is not available for home IT system consulting. Students are expected to know how to manage their own home systems.

Students must also have a webcam and a reliable internet connection capable of streaming "real-time" audio and video via Zoom Online Conferencing. Cell phones and/or tablets will NOT be sufficient, except for viewing PDF files or other NON-CAD files. Please note that you do NOT need to sign up for or download Zoom to join the online class. Zoom can be accessed from a web browser. You will be emailed an invitation containing a link to join via a compatible web browser such as Mozilla Firefox or Google Chrome. Both are free to download.

Students must also have the ability to print 8-1/2" x 11" sheets of paper (B&W is fine) and scan completed assignments to a PDF document for submission via Canvas (unless otherwise instructed). Clear and legible (in your instructor's opinion) digital images may be considered acceptable in lieu of scanning.

Please test your equipment and ensure that everything is working properly PRIOR to the first day of class.

Autodesk provides a free student download of the educational version of Civil 3D 2025. The Autodesk software is available here: http://www.autodesk.com/education/free-software/autocad-civil-3d. The Civil 3D software is very hardware-intensive, so be certain that your computer meets or exceeds the minimum system requirements prior to installation. As an alternative, students may utilize SRJC's Virtual Lab. Please be advised that we will be using the **2025** version of AutoCAD Civil 3D and it is not backwards compatible with earlier versions. ***When you download the software for home use, be certain to select only the 2025 version. Please note that it is only necessary to download Civil 3D 2025, as it also includes basic AutoCAD 2025 functions.*** Before attempting to download and install the software, students should be proficient at software installation, file management, and correctly transferring class data between their own computers and Canvas. Your instructors will NOT be answering any software installation-related questions because every computer is different.

It is the student's responsibility to consult the SRJC web-based information listed below -- please do so as it is considered a part of this syllabus:

- SRJC Schedule of classes: https://classes.santarosa.edu/
- SRJC Academic Calendar: http://admissions.santarosa.edu/academic-calendar/
- SRJC Rights & Responsibilities: https://rightsresponsibilities.santarosa.edu/
- SRJC Disability Resources: http://drd.santarosa.edu/
- SRJC Student Services: https://student-services.santarosa.edu/

Academic Integrity

The instructor has zero tolerance for academic dishonesty of any kind. Per SRJC Policy 3.11: Academic dishonesty is regarded as any act of deception, benign or malicious in nature, in the completion of any academic exercise. Examples of academic dishonesty include cheating, plagiarism, impersonation, misrepresentation of ideas or fact for the purpose of defrauding, use of unauthorized aids or devices, falsifying attendance records, violation of testing protocol, or inappropriate course assignment collaboration. Academic dishonesty on any homework assignment, lab assignment, quiz, or exam will result in ZERO credit for that assignment.

UNLESS OTHERWISE INSTRUCTED, ALL ASSIGNMENTS ARE TO BE COMPLETED INDEPENDENTLY!

Class Conduct & Courtesy

During the lectures: Students should be listening to the lectures and presentation. Unless instructed to do so, students shall refrain from working on assignments during the lecture or presentation. Note taking is strongly encouraged. Per SRJC district policy, absolutely no recording of lectures is permitted without express permission of the instructor. Students shall please refrain from having conversations, checking your email or web-browsing on either computers or smart phones. These behaviors are distracting to other students and to the instructor. **No student is allowed to print or plot when in Lindley 196 or 186 without permission.**

The above distractions or any disruptive behavior during class **are grounds for being excused from class (on Zoom or in-person) with a loss of that day's work.** Repeated events will result in disciplinary action via the Department Chair, Dean or Vice President of Academic Affairs.

During Laboratory: Kindly remember that other students may have different study habits and priorities than you do. Please speak softly when conversing with other students. Avoid long and/or social (unrelated to class matters) dialog in the computer lab. Take such conversations outside.

During open lab times or when other classes are in progress:

There will be open lab time in the computer lab, Lindley 196. A schedule will be posted on the doors to the labs. There may be lab seats available during other courses in progress. When desiring to occupy an empty station during a lecture, students should politely inquire with the instructor prior to just taking a seat. If a student shows up late and you are occupying their seat, you must vacate IMMEDIATELY. CEST 51 students will comport themselves per the course syllabus guidelines whenever using the computer labs. You represent the CESGT Program to others.

Cell Phones: Turn cell phone ringtones off and if you must receive a call please go outside during your phone conversation.

ABSOLUTELY NO EATING OR OPEN DRINKS ALLOWED IN CLASS or COMPUTER LABS!!!

Passwords, Accounts and Access Codes: Students will be given SRJC computer user accounts and will be required to establish user accounts at other websites. It is the responsibility of the student to keep track of their user names, passwords and security codes. Lost or forgotten passwords are not an acceptable reason for incomplete assignments.

Computer Labs, Computers, Equipment and Equipment Handling:

In comparison to many other campuses, SRJC has a brand new building and recently updated, cutting edge computer hardware, software and output facilities. In order to provide optimum laboratory access and usage experience; if applicable, all students are expected to be familiar with and follow the posted rules for the computer labs (Lindley 196, 186). Any student observed violating the rules may be excused from class (first offense). Repeat offenses will result in a student being suspended or dropped from the class. In some classes your personal computer profile will NOT follow you to another class or classroom.

All students are expected to treat any SRJC laboratory equipment with proper care. Damaged or malfunctioning equipment shall be promptly reported to the instructor by the operator. Students observed mistreating any CESGT lab equipment will receive a warning. Repeat offenders will be suspended or dropped. All loaner equipment shall be returned per the policy and directions of the loaner source. Non-return of said equipment will result in legal and academic penalties. 8 All CESGT students are to treat the SRJC classroom computer equipment with proper care. Any damaged or malfunctioning computer equipment shall be promptly reported by the operator to the instructor by the operator. Students observed mistreating any computer equipment will receive a warning. Repeat offenders will be suspended or dropped. Students excused from class activities for mistreating equipment will **not** be allowed to make up that day's work.

There are data volumes (folders) and documentation files for the various devices and software applications. This documentation can be found in the \PATHNAME*\Library folder and the various subfolders on the SRJC File Depot and if operational, student local and network drives. The majority of the support documentation is in PDF format. Students are expected to be familiar with the use of Adobe Acrobat Reader software. Please make certain that you allow yourself the necessary time to transfer the appropriate support documentation in advance of assignments and class exercises.

SRJC provides laboratory supervision and limited software support during the open lab hours on the Santa Rosa Campus. Please familiarize yourselves with Mr. Todd Amos' schedule. He is super knowledgeable and a valuable resource.

* PATHNAME=the SRJC network drive pathname to be established in class for the file location or locations.

LINDLEY 186 and 196 Network Drives

Drive C: Local hard drive in the computer

Drive F or ?: Private drive unique to each person-copy class materials to this drive.

Drive N: (Read-only to students. Full-access to faculty and staff. Copy distributed class materials FROM this drive ASAP)

Drive M: (Full-access to everyone) will be deleted periodically. Please don't leave your important files on this drive.

NOTE: Student USB drives or external HDDs should be inserted **AFTER** logon is complete. External HDDs and USB drives should be used for backup and transfer of materials to outside/personal computers.

Syllabus Purpose and Disclaimers

This syllabus constitutes an agreement. Continued participation (past day 1) in CEST51 means that you, the student, tacitly agree to the policies and procedures outlined in this document and any verbal course directives provided in class. If some aspect or aspects of the syllabus are unclear to a student, it is their responsibility to inquire regarding that matter before the second class meeting.

This syllabus is intended to provide the student with guidance on what will be covered during the semester and will be followed as closely as possible. ***However, the instructor reserves the right to modify, supplement or make changes as necessary for general course needs as the semester progresses.***