Computer-Aided Design

Course prefix: ME

Course number: 6104

Section: A, Q

CRN (you may add up to five):
28303 28304

Instructor First Name: Yan

Instructor Last Name: Wang

Semester: Spring

Academic year: 2026

Course description:

The course will cover the fundamentals of CAD, including geometric and solid modeling, parametric representations, features, and human-machine interactions, as well as the applications to design, analysis, and manufacturing.

This class does not teach how to use commercial CAD software tools themselves, assuming students learned the basics in their undergraduate years. We focus more on geometric modeling (mathematical and computational foundation) which CAD tools are based upon.

Topics:

- Homogeneous Coordinates, Transformation
- Parametric Surfaces (Hermite, Bezier, B-spline)
- Solid Modeling (CSG, Euler-Poincare formula, Euler Operators)
- Implicit Surface Modeling (R-function, Offset, Metamorphosis)
- Artificial Intelligence for Design

Course learning outcomes:

Students are expected:

- to learn the fundamentals of geometric modeling and visualization for computer-aided design and engineering;
- to be familiar with algorithms and methods in computational geometry

Required course materials:

Reference books (not required):

- Michael E. Mortenson, *Geometric Modeling*, 2nd Edition, John Wiley, 1997
- Requicha A. *Geometric Modeling: A First Course (online)*
  https://sites.usc.edu/requicha/home/geometric-modeling-a-first-course/

Grading policy:

- Homework/mini projects   (50%)
- Quizzes   (20%)
- Final Project   (30%) – Project presentation is regarded as oral exam

Attendance policy:

Regular class attendance is required for all students enrolled in Section A. The fact that classes are scheduled is evidence that attendance is important; students should, therefore, maintain regular attendance if they are to attain maximum success in the pursuit of their studies. Distance-learning students in Section Q have access to all lecture recordings and are not required to attend class live.

Academic honesty/integrity statement:

Students are expected to maintain the highest standards of academic integrity. All work submitted must be original and properly cited. Plagiarism, cheating, or any form of academic dishonesty will result in immediate consequences as outlined in the university's academic integrity policy.