CS 598: Digital Agriculture for Engineers – Fall 2025 Syllabus

Schedule: Tuesdays & Thursdays, 9:30–10:45 AM | Aug 26 – Dec 10, 2025
Location: Siebel School for Computing and Data Science (SSCDS 2406)
Credits: 4
Instructor: Dr. John F. Reid, Research Professor, SSCDS, Agricultural and Biological Engineering, Electrical and Computer Engineering

Prerequisites: Graduate-level standing with a strong technical background in science and engineering

Course Description

This graduate-level course offers a foundational understanding of digital agriculture through the lens of modern crop production systems. Students will explore transformative technologies—automation, connectivity, electrification—and the emerging role of AI in advancing productivity and convenience. The course emphasizes safety, AI integration, and technology translation to prepare students for careers in ag tech, robotics, and systems engineering. Learning experiences will include lectures, independent research, conceptual design projects, and guest lectures from industry leaders.

Learning Objectives

1. Explain the structure and dynamics of modern agricultural production systems, including their unique engineering constraints.
2. Describe core digital technologies that enable precision and autonomous agriculture, including automation, AI, perception, electrification, and connectivity.
3. Apply systems engineering to define and solve agricultural problems through human-centered design, grounded in stakeholder needs and farmer pain points.
4. Analyze agricultural machine systems from a controls, perception, safety, and electrification perspective.

5. Model data flow and edge/cloud compute architectures for real-time, scalable agricultural decision-making.
6. Evaluate sustainability strategies and circular bioeconomy concepts within digital farming systems.
7. Assess business models and technology readiness for agricultural automation solutions.
8. Design and present a conceptual AI-based engineered solution for a real-world digital agriculture problem.

Industry Guest Lectures

Experienced industry speakers will present to the class on key topics in human-centered design, data & analytics in ag, autonomy & architecture, Safety in autonomous systems, digital twins & simulation, perception systems & CVML, systems engineering in ag, business models & translation into practice.

Project

Students will work in interdisciplinary teams to research, design, and present a conceptual AI-based solution for a real-world agricultural challenge. The project will culminate in a conference-style paper and a poster presentation during the last three weeks of the semester.

Course Format

Meeting Times: Tuesdays & Thursdays, 9:30–10:45 AM (Aug 26–Dec 10)
Guest Lectures: 8+ lectures delivered by practicing engineers from industry (Thursdays)
Delivery: In-person, limited hybrid/asynchronous learning support available for lectures
Projects: Team-based, culminating in a conference-style paper and a poster presentation
Final Presentations: Final 3 weeks reserved for 15-minute student poster presentations with peer reviews

Grading Summary

Grades in this course are based on participation, guest lecture reflections, and a semester-long team project consisting of a proposal, midterm report, final poster presentation, and final written report. The project is a substantial part of the course, providing students the opportunity to apply digital agriculture technologies to a real-world problem. Each deliverable is graded with a rubric emphasizing clarity, technical depth, and relevance to course themes.

Detailed Grading Rubrics

Participation & Discussion (10%)

- 50 pts: Regular attendance (≤ 2 unexcused absences)
- 30 pts: Engagement in class discussions and Q&A
- 20 pts: Active contribution to class discussion/peer poster reviews

Guest Lecture Reflections (10%)

4 reflections required (max 2 pages each, 25 pts each = 100 total). Graded on:
- 10 pts: Summary of key points (accuracy, conciseness)
- 10 pts: Personal insights and critical evaluation
- 5 pts: Writing clarity & organization

Project Proposal (10%)

- 30 pts: Problem definition & relevance
- 30 pts: Technical approach & feasibility
- 20 pts: Expected outcomes & success criteria
- 20 pts: Clarity and structure

Midterm Project Report (20%)

- 25 pts: Technical progress and early results
- 25 pts: Quality of analysis and reasoning
- 25 pts: Documentation of teamwork and timeline
- 25 pts: Report clarity and organization

Final Poster Presentation (20%)

- 25 pts: Problem statement & motivation
- 25 pts: Technical depth & results presented
- 20 pts: Visual clarity and design of poster
- 20 pts: Oral delivery and Q&A responses
- 10 pts: Peer review scores (average rating)

Final Report (30%)

- 20 pts: Problem framing and relevance
- 25 pts: Technical methods and tools
- 25 pts: Results, evaluation, and discussion
- 15 pts: Integration of course themes
- 15 pts: Writing quality, references, and formatting