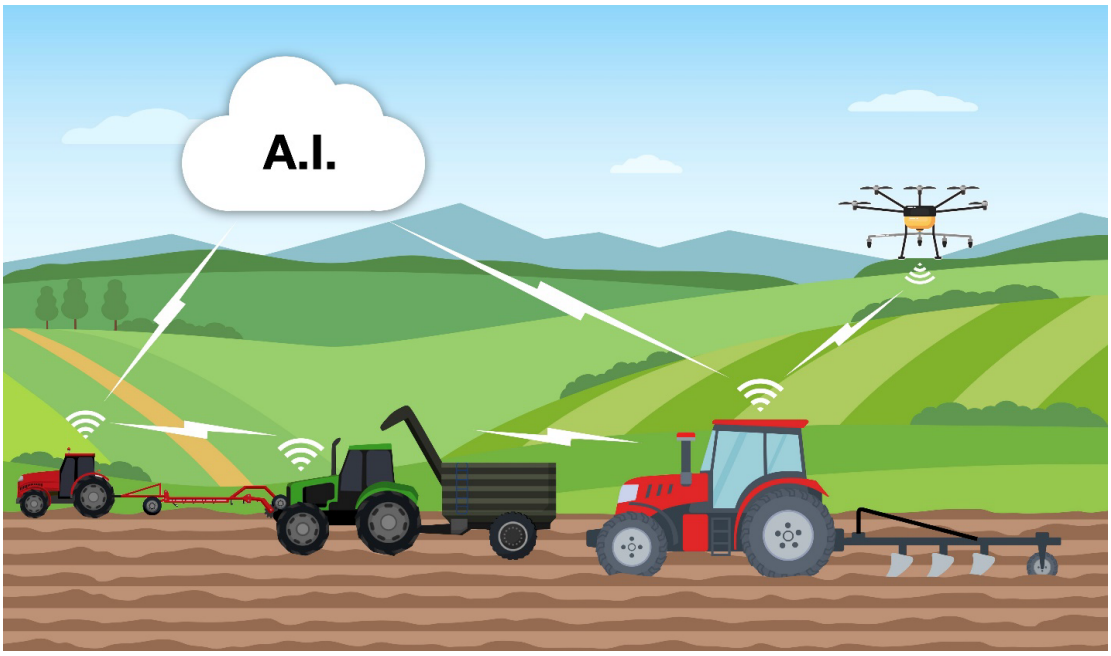
ABE 598/CS 598 (DAG and DAO): Digital Agriculture for Engineers – Fall 2026 Syllabus



Note: This course is being taught in hybrid mode and will have both in-person and on-line students.

Lecture Schedule: Tuesdays & Thursdays, 9:30–10:45 AM | Aug 25 – Dec 9, 2026 (Recorded lectures will be available to online students the same day)

Location: Siebel School for Computing and Data Science (SSCDS 2406)

Credits: 4 hours

Instructor: Dr. John F. Reid, Research Professor, SSCDS, Agricultural and Biological Engineering, Electrical and Computer Engineering

Office Location: 4028 NCSA.

- **In-person Office Hours:** Tuesdays: 1:00-2:00 PM
- **Evening Office Hours:** Wednesdays, 7:00PM -8:00PM (Zoom)
  - Zoom link will be posted in Canvas → *Office Hours Zoom Room*.
- **By Appointment:** If you cannot make the scheduled hours, please email me to set up an appointment.

Prerequisites: Graduate-level standing with a moderate to strong technical background in science and engineering. Available for professional degree credit.

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/Academic Guest Lectures

Experienced industry and academic leaders in digital agriculture 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 25–Dec 9)

Guest Lectures: 8+ lectures delivered by practicing engineers from industry (typically recorded on Thursdays)

Delivery: In-person, hybrid/asynchronous learning support available for lectures

Projects: Team-based, culminating in a conference-style paper and a poster presentation

Final Presentations: Final weeks lectures are reserved for 15-minute student poster presentations with peer reviews. Project teams may (and should) include combinations of in-person and remote learners.

Grading Summary

Grades in this course are based on active participation, guest lecture reflections, and a semester-long team project consisting of a proposal, mid-term 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 & Engagement (8%)

- 30 pts — Consistent participation in scheduled course activities, either synchronously or through designated asynchronous alternatives
- 30 pts — Substantive contributions to class discussions, online discussions, Q&A, polls, or collaborative activities
- 20 pts — Constructive peer feedback, including project/poster reviews
- 20 pts — Evidence of preparation and engagement with course material

Guest Lecture Reflections (7%)

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

Note: Guest lectures will all be recorded for asynchronous-compatibility.

Discussion Forums (10%)

You will have 4 opportunities to contribute to online forums (keeping the top 3 scores)

- 5 pts — Quality and technical substance of initial contribution
- 3 pts — Meaningful engagement with peers
- 2 pts — Professionalism and constructive dialogue

Project Proposal (10%)

- 30 pts: Problem definition & relevance
- 20 pts: Expected outcomes & success criteria
- 20 pts: Clarity and structure
- 30 pts: Technical approach & feasibility. Include:
  - team member responsibilities;
  - collaboration tools and methods;
  - data/software/hardware dependencies;
  - how team members will contribute;
  - expected deliverables from each member.

Midterm Project Report (15%)

- 25 pts: Technical progress and early results
- 25 pts: Project management, teamwork, and individual contributions. Include a contribution table in your report with:

• **Member**	• **Responsibilities**	• **Work completed**

- 25 pts: Report clarity and organization
- 25 pts: Quality of analysis and reasoning

Final Project Presentation (20%)

This will be a recorded team presentation with a team poster being the visual artifact of your project.

- 25 pts — Problem statement and motivation
- 20 pts — Visual communication and organization
- 20 pts — Presentation and ability to respond to questions
- 10 pts — Peer evaluation
- 25 pts — Technical depth and results

We will post these for the entire class to review and will use a discussion forum to allow asynchronous Q&A.

Final Report (30%)

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

Projects are evaluated according to the rigor with which the selected methods are applied and evaluated, rather than whether the project includes physical experimentation.