

Agricultural Equipment Design and Fabrication

Grade Level:

10th, 11th and 12th

Course Duration:

One Year

Teacher:

Lee Blanton

Room Number:

614 A

Contact Information:

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Office Hours:

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Course Overview

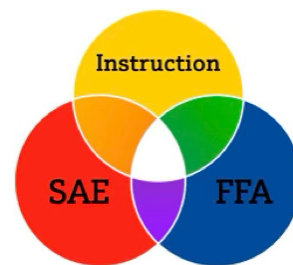
In the Agricultural Equipment Design & Fabrication course, students will acquire knowledge and skills related to the design and fabrication of agricultural equipment. To prepare for careers in mechanized agriculture and technical systems, students must attain knowledge and skills related to agricultural equipment design and fabrication.

Supervised Agricultural Experiences (SAE)

All students will be required to maintain an SAE project and document their progress using the Agricultural Experience Tracker (AET).

Three-Part Agricultural Education Model

1. Classroom Instruction: Students will receive hands-on and theoretical instruction in agricultural mechanics and metal technologies.
2. FFA Participation: Students are encouraged to join and participate in the National FFA Organization and participate in leadership development events, career development events, and community service activities
3. Supervised Agricultural Experience (SAE): Each student will develop and maintain an SAE project, which will be documented using the AET platform. SAE projects can include entrepreneurship, placement, research, or exploratory experiences related to agricultural mechanics or other agricultural fields.



Course Content and Structure

- Develop an understanding of the principles of agricultural equipment design and fabrication, including mechanical and structural systems.
- Apply scientific, mathematical, and engineering concepts to solve real-world agricultural equipment challenges.
- Demonstrate safe and proper use of tools, machinery, and equipment in agricultural fabrication.
- Foster critical thinking, teamwork, and problem-solving skills in the context of agricultural equipment design.
- Understand and apply industry standards and practices in agricultural fabrication.
- Prepare students for potential careers in agricultural engineering, mechanics, or related fields.

Skills and Knowledge Students Should Gain by the End of the Course

1. Proficiency in welding, cutting, and other fabrication techniques.
2. Ability to draft and interpret plans, blueprints, and technical drawings.
3. Knowledge of material selection and structural design principles specific to agricultural applications.
4. Understanding of safety protocols and hazard management in a fabrication environment.
5. Competence in using equipment such as grinders and plasma cutters.
6. Practical experience in designing, building, and evaluating agricultural equipment or tools.
7. Familiarity with career opportunities and educational pathways in agriculture and engineering.

Weekly Course Breakdown

1. Weeks 1-2: FFA/SAE Overview and Development
 - Introduction to the National FFA Organization and its role in agricultural education.
 - Development of Supervised Agricultural Experiences (SAEs) and their integration into the course.
 - Exploration of leadership and career development opportunities through FFA.
2. Weeks 3-4: Career Exploration in Agricultural Equipment Design
 - Overview of careers in agricultural equipment design, fabrication, and engineering.
 - Guest speakers or virtual tours of industry facilities.
 - Research and presentation on career pathways and educational requirements.
3. Weeks 5-10: Safety in Agricultural Equipment Design and Fabrication
 - Comprehensive safety training for shop tools, machinery, and welding equipment.
 - Identification and use of Personal Protective Equipment (PPE).

- Hazard identification and risk management in the shop environment.
 - Safety quizzes and hands-on demonstrations.
4. Weeks 11-18: Tools, Machines, and Equipment in Fabrication
 - Identification and proper use of hand tools, power tools, and machinery.
 - Maintenance and troubleshooting of tools and equipment.
 - Hands-on practice with welding, cutting, and shaping techniques.
 - Introduction to MIG, TIG, and stick welding processes.
 5. Weeks 19-24: Blueprint Reading, Design, and Measurement
 - Fundamentals of blueprint reading and interpretation.
 - Introduction to drafting techniques and Computer-Aided Design (CAD) software.
 - Measurement tools and techniques for precision fabrication.
 - Application of geometry and algebra in design and layout.
 6. Weeks 25-30: Materials Science and Fabrication Processes
 - Properties and selection of materials for agricultural equipment.
 - Structural analysis and stress testing of fabricated components.
 - Advanced welding and fabrication techniques.
 - Practice projects to reinforce skills learned in earlier units.
 7. Weeks 31-36: Capstone Project: Design and Fabrication of Agricultural Equipment
 - Collaborative design and fabrication of a functional agricultural tool or piece of equipment.
 - Application of all skills learned throughout the course.
 - Testing and evaluation of the final product.
 - Presentation and peer evaluation of capstone projects.

Supervised Agricultural Experience (SAE)

Each student is required to develop and maintain an SAE project throughout the course. SAE projects allow students to apply the skills they learn in class to real-world agricultural experiences. Students will document their SAE progress using the Agricultural Experience Tracker (AET), every Friday.

Examples of SAE projects include:

- Welding and fabricating custom equipment or structures.
- Repairing and maintaining agricultural machinery.
- Assisting with electrical or plumbing projects on a farm or ranch.
- Researching and developing innovative solutions for agricultural mechanics challenges.

SAE Expectations:

1. Students must log hours, activities, and reflections in AET weekly Friday.
2. SAE projects will be evaluated based on effort, documentation, and alignment with course objectives.

3. Students will present their SAE projects at the end of the year as part of their final grade.

Types of Assignments:

1. Hands-On Projects:
 - Building and fabricating metal structures.
 - Repairing agricultural equipment and systems.
 - Designing and constructing custom projects based on blueprints.
2. Written Assignments:
 - Research essays on agricultural mechanics topics.
 - Technical reports on completed projects.
 - Reflections and evaluations of individual and group work.
3. Quizzes and Tests:
 - Weekly quizzes on safety protocols, tool identification, and technical concepts.
 - Unit tests covering welding techniques, mechanical systems, and project planning.
4. SAE Documentation:
 - Weekly AET entries documenting SAE progress.
 - Mid-year and end-of-year SAE evaluations.
5. Capstone Project:
 - Students will design and complete a capstone project that integrates skills learned throughout the course.
 - Projects will be presented to the class and evaluated based on craftsmanship, creativity, and alignment with course objectives.

Assessment Methods:

1. Major Grades (40 %)
 - Exams and Quizzes
 - Projects and Fabrication Work
 - SAE Presentation
2. Minor Grades
 - SAE Documentation
 - Graded based on completeness, organization, and quality of AET entries.
 - Class Participation and Professionalism
 - Active engagement in class discussions and activities.
 - Adherence to safety protocols and proper use of equipment.
 - Teamwork, leadership, and communication during group tasks.

Additional Information:

FFA Participation

- Students are encouraged to join the National FFA Organization to enhance their leadership, teamwork, and communication skills. FFA activities include leadership development events (LDEs), career development events (CDEs), and community service projects.

Important Dates

- SAE Project Proposal Due: September 1st
- Semester Exam SAE Evaluation: December 1st
- Final Exam SAE Presentation: May 1st
- Capstone Project Completion: May 1st

This syllabus reflects the integration of the Three-Part Agricultural Education Model and emphasizes the importance of hands-on learning, FFA participation, and SAE projects. Let me know if you need additional changes!

Personal Protective Equipment (PPE)

- **Failure to dress out for Shop days will result in loss of Participation points**
- **PPE Includes: (please let me know ASAP if you are unable to provide**
 - Safety Glasses (1 pair provided by school)
 - Welding hood (Welding hoods available to use if you do not want to purchase your own)
 - Closed Toe Leather Shoes
 - Welding Gloves
 - Hearing Protection
 - Long pants (Cotton)
 - Long Sleeve Shirt (Does not have to be FR, but must be Cotton)
 - Examples: Wrangler work shirts, Dickies, Ariat, Cowboy Gear