INDUSTRIAL SOLUTIONS LABORATORY

Department Project Information

Department Name	*MEES - Motorsports*	**Date Submitted**	*07/09/2026*
Project Title	*FSAE EV Competition Car (FSAE_ELECT7)*	**Planned Starting Semester**	*Fall 2026*

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

Discipline	Number	Discipline	Number
Mechanical	6-7	Electrical	1-2
Computer	1-2	Systems	
Other ( )			

Project Overview:

This is a new project. Every Formula SAE competition year requires the design and construction of a new car. While parts from prior cars may be reused and knowledge transfer from past years is encouraged to serve as the foundation of each year's effort, it must be understood that this Formula SAE project encompasses the entire design and build process of a new car.

Per the SAE International Formula SAE rulebook, "The Formula SAE® competitions challenge teams of university undergraduate and graduate students to conceive, design, fabricate, develop and compete with small, formula style vehicles. Formula SAE® is an engineering education competition that requires performance demonstration of vehicles in a series of events, both off track and on track against the clock. Each competition gives teams the chance to demonstrate their creativity and engineering skills in comparison to teams from other universities around the world."

Each student team designs, builds and tests a prototype based on a series of rules whose purpose is both to ensure onsite event operations and promote clever problem solving. The vehicle will be inspected in a series of tests to ensure it complies with the competition rules; in addition, the vehicle with driver will be judged in many performance tests on track. The rest of the judging is completed by experts from motorsports, automotive, aerospace and supplier industries on student design, cost and sales presentations. UNC

Charlotte has separate teams competing in the Formula SAE Internal Combustion and Electric Vehicle competitions. This senior design project is in support of the electric vehicle team.

This specific project is focused on the completion of the 2027 FSAE EV competition car. It is intended for current members of the Formula SAE team in good standing and in positions of leadership and/or design responsibility. This project has responsibility for the overall design concept, detailed design, fabrication, assembly, testing, and operation of the major system components of the competition car. The project scope and required time and effort commitment exceed the typical minimum requirements for Senior Design projects. 30 to 40 hours per week on this project are not unusual and often required in order to complete the necessary deliverables on schedule.

Project Requirements:

The FSAE Electric Vehicle Senior Design project team will work alongside the club team to complete the 2027 competition vehicle. All team members are expected to contribute to the design, fabrication, building and testing of an internal combustion FSAE competition vehicle in accordance with the FSAE 2027 Rules. The team is also required to prepare and present sales, design evaluation, cost, and technical inspection documents in accordance with competition rules.

This project is specifically focused on the major design concept and completed build of the competition vehicle. Members of this project are expected to be team leads, system leads, or design team members responsible for major, mission-critical components of the vehicle. This team is the ultimate responsibility for completion of the car. While some tasks, projects, and components may be delegated to non-senior members of the design team or the club team, members of this team are responsible for overseeing this work and ensuring it is completed in the event that other team members fail to do so.

The Senior Design team members will be required to clearly identify the specific work contributions and areas of responsibility distinct from the club effort. Coordination with club members is required to ensure projects fit within the team competition goals. Senior Design team members are expected to produce work commensurate with their senior standing and experience. Team members will be required to take laboratory safety tests to access the team workspaces. All team members are expected to attend pre-competition testing events and to participate in team outreach and fundraising. The Formula SAE competition is very demanding, and a successful effort requires at least an average of 20 hours per week from each team member, and work is to include fall, winter, and spring break times. Typical efforts will usually exceed that minimum.

For full credit the team must complete a car that is ready to compete in the 2027 Michigan event before the end of the Senior Design II term. Failure to be ready to compete in the 2027 Michigan event may result in an unsatisfactory grade at the sole discretion of the mentor. A car that is ready to compete will not only be fully complete, but will have significant testing completed proving to the satisfaction of the grading members that the car is fully functional and sufficiently robust to complete the competition.

Expected Deliverables/Results:

Deliverables include:
- All senior design course deliverables
- All competition deliverables as specified by SAE
- Complete 3D CAD Design and component sources
- BOM for sources
- Documentation and calculations
- Operational and Competition ready FSAE Car
- Data acquired from pre-competition tests

Disposition of Deliverables at the End of the Project:

Hardware developed and documentation for competition is the property of the mentor and department.

List here any specific skills, requirements, specific courses, club affiliation, knowledge needed or suggested (If none please state none):

- Motorsports concentration – Not required, but motorsports concentration has priority
- Student Member of SAE and the FSAE student organization– Desired but not required. Design team, team captain, or system lead status has priority. New members must have the understanding that the expectations and requirements for this project exceed typical senior design minimums.
- Proficiency in at least one of the following software environments:
    - CAD: Solidworks
    - FEA: Ansys
    - CFD: Star CCM
    - Scripting: MATLAB, Python
    - Dynamic system simulation: Dymola
    - Data acquisition and Engine Control: Motec