CLEVELAND STATE UNIVERSITY

WASHKEWICZ

COLLEGE OF ENGINEERING

SENIOR DESIGN PROGRAM

A Win-Win Partnership Opportunity

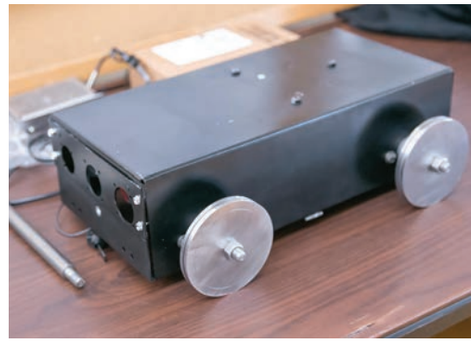
DESCRIPTION

Senior Design is a capstone project culminating the education of engineering students at Cleveland State University's Washkewicz College of Engineering. All senior students in the ten engineering degree programs participate:

- Biomedical Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Computer Science
- Construction Management
- Data Science
- Electrical Engineering
- Electronic Engineering Technology
- Mechanical Engineering
- Mechanical Engineering Technology

MORE INFO

Senior Design projects typically span two-semesters (Fall and Spring) giving students the opportunity to incorporate the engineering principles they have learned during their academic years into one final project. The course is a graded required course, offering students the opportunity to apply their rigorous training in engineering, design and project management to the performance of a real-world project defined by a client/ sponsor.



PROJECT EXPECTATIONS & DELIVERABLES

Under the guidance of a faculty advisor and collaboration with the sponsor, students work in teams to solve challenging design problems as part of their capstone experience. The project includes the development of a comprehensive plan with the description of the problem, followed by determining design alternatives, formulating a budget, specifying equipment requirements, making a time schedule, proceeding with a final design and, in most cases, creating a prototype. Each student is expected to spend an average of 200 hours working on their project (up to 800 person-hours for a four-person team).

Deliverables to the sponsor may include some or all of the following:

1. **Comprehensive project plan with a project description, design analyses, design alternatives**
2. **Budget, equipment and material requirements**
3. **Time schedule**
4. **Solid models, prototype, engineering drawings**
5. **Software & data**

Students will make oral presentations and submit written reports. Depending on the design and solution, videos and demonstrations can be part of the final delivery.

SPONSOR BENEFITS

1. Cost-effective solutions to engineering challenges
2. Exposure to corporate and team environments
3. Identifying talent for employment
4. An active role in shaping Washkewicz College of Engineering's "Future Engineers"
5. Fresh ideas, out-of-the-box solutions to real problems
6. Corporate exposure on campus
7. Company recognition in the College's and University's print and online promotional materials

AVAILABLE RESOURCES

Project teams may draw on the expertise of faculty instructors, faculty advisors and state-of-the-art resources from across the Washkewicz College of Engineering, including the Dan T. Moore MakerSpace, which provides facilities for:

- **3D Printing:** Fortus 250mc, Ex One Innovent, Mojo, Object Connex3-350, uPrint Plus
- **Computer-Aided Design and Analysis Tools:** such as SolidWorks, MATLAB, PSpice, Arduino, MultiSim, GNU Radio, LabView, Aspen
- **Machine Shop:** Lathe, CNC Machine, Hand tools, Power tools and Drill Press

STUDENT BENEFITS

1. Opportunity to connect curriculum to real-world applications
2. Exposure to corporate working environments and relationships
3. Improved marketability during the job search process
4. Mentoring from professional engineers and faculty advisors
5. Developing active problem analysis and design analysis skills
6. Gaining exposure to patent, intellectual property and confidentiality essentials

SPONSOR REQUIREMENTS

A successful sponsored Senior Design project requires that the sponsoring organization assign a motivated individual to interact with the students throughout the project duration.
The sponsor is expected to:

- **Attend all four on-campus events: Project Kickoff Meeting, Fall Final Presentations, Spring Final Presentations and the Senior Design Symposium where all student design projects are on display.**
- **Provide more detailed information regarding the project than the initial project proposal.**
- **Assist students by facilitating visits to the sponsor's location.**
- **Interact regularly with the students at the sponsor's site, at CSU, by email, telephone and/or video conferencing.**
- **Review reports and provide feedback from the industry point of view.**
- **Evaluate the performance of the students at the end of each semester; this evaluation will be shared with faculty advisors and may be included in the student's final grade.**
- **Demand constant professionalism and a high level of performance from students.**

PROJECT SUBMISSION

Early collaboration between the sponsor and Washkewicz College of Engineering faculty is crucial to the development and execution of a successful Senior Design project. To begin the process, a one-page project proposal from the project sponsor is necessary; it will detail the contact information, objectives, motivation and deliverables for the project and it can be submitted electronically by the sponsor at:

bit.ly/SubmitProjectProposals

To guarantee consideration, the project proposal should be submitted by the deadline posted on the website. The project proposals will be disseminated to all senior students for selection during the first week of the semester.

TEAM SELECTIONS

The Project Kickoff is hosted in a career-fair style where Senior Design students will visit project tables to learn more about each project proposal.

Teams of 3 to 4 students will be created after the Kickoff Event, based on three factors: the students' project preferences, the majors that are requested by the sponsor, and the project proposals submitted by students to the faculty advisor.

PROJECT MANAGEMENT

CSU Senior Design faculty serve as the main project manager. Upon confirming sponsorship, the sponsor assigns a 'Technical Mentor' to serve as the contact person who works directly with the student team(s). The teams can be viewed as outside 'consultants' working on the project while the project manager oversees the consultant team's work to ensure it meets the company needs.

Washkewicz College of Engineering faculty advise the student teams and the industrial sponsors serve as mentors to the team.

FINANCIAL COMMITMENT

The cost of sponsorship is $5,000 per team, per academic year (August-May), and sponsorship is considered a philanthropic gift to the CSU Foundation. Since this is a tax deductible, charitable contribution to the University, no guarantees can be made of project outcomes. This sponsorship includes $3,000 to cover material costs for the project, while the remainder covers administrative expenses associated with the program. The sponsor is expected to supply all possible physical resources needed if they are not already available at the University. Should additional resources or equipment be needed to complete the project, students are expected to justify their acquisition via a written proposal to the sponsor.

INTELLECTUAL PROPERTY AND CONFIDENTIALITY

The Senior Design project should not be seen as a traditional research project. In accordance with the spirit of this program and for other consideration duly given, the sponsor will receive and own the direct results from the project(s) including written reports and feasibility prototypes. CSU will not claim any ownership of inventions resulting from the project; it is the responsibility of the sponsor to obtain the appropriate waivers/assignments, if any, from the students. Students will be named as inventors as required by the patent laws on any patent covering inventions made by them.

If the sponsor deems it necessary to convey to the Washkewicz College of Engineering faculty, staff and/or students information that is confidential or proprietary to the sponsor's business, a separate confidentiality agreement may be entered into with the recipients of such confidential information.

SENIOR DESIGN SYMPOSIUM

The Senior Design program concludes with each team making a final presentation to a panel of faculty and industry representatives, followed by awarding of cash prizes to the top Senior Design teams at the Senior Design Symposium and Poster Competition. This event is the major exhibition of the Senior Design projects. Typically, more than 80 projects are displayed, including industry-sponsored, student-led, faculty-led projects, and competition projects. The Symposium is an excellent opportunity to recruit new talent and to network with other industry members.

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